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MOORE (E[NID] S.). **A virus disease of Tobacco in South Africa.** —*Nature*, cxxix, 3258, p. 544, 1932.

A virus disease of tobacco somewhat similar to, but distinct from, ring spot [*R.A.M.*, xi, p. 406] is stated to be causing increasingly heavy losses each year in the Stockenstrom district of the eastern Cape Province. A constant feature of the disturbance is the sudden cessation of apical growth and the stunting of the leaves that are in process of formation. Leaf spotting is usually of a ring spot or hieroglyphic type, often definitely related to the veins in a fern-leaf pattern. The young leaves show marked distortion and blistering, often accompanied by vivid mottling. In varieties of the Burley type general chlorosis is common, followed by discoloration of the cortex and pith of the stem and by root decay associated with secondary organisms. Diseased plants either die outright or survive in a stunted condition, sometimes making partial recovery and putting out new growth from terminal or lateral shoots.

The disease is very rarely transmissible by needle puncture but may readily be induced by the insertion of an affected shoot, as in grafting. The best mode of transmission, however, is by the feeding of a thrips of the *Frankliniella* type which under field conditions appears to be the sole vector.

In the same locality tomatoes are affected by a disease apparently identical with the spotted wilt of Australia [ibid., xi, p. 549]. Distinctive diseases of *Datura stramonium*, two species of *Physalis* and *Nicandra physaloides* also occur in the fields and are transmitted by the same insect vector. Cross-inoculation experiments indicate that all six diseases are caused by an identical virus.

BRIANT (A. K.). **Tomato diseases in Trinidad.**—*Trop. Agriculture*, ix, 3, pp. 63–71, 3 pl. (1 facing p. 88); 4, pp. 101–105, 1932.

In this paper the author gives some details of the investigation started in 1931 of the etiology and control of the chief physiological and parasitic diseases that attack tomatoes in Trinidad. Among the economically important troubles of the crop are stated to be the wilt diseases caused by *Bacterium solanacearum* [*R.A.M.*, x, p. 493], *Fusarium lycopersici* [ibid., x, p. 742],

and *Sclerotium rolfsii* [ibid., x, p. 752], all of which occur commonly in the island and occasionally cause almost total loss of the crop. The occurrence of the two first-named organisms in the soil and their pathogenicity to tomato plants were amply demonstrated by isolations and inoculation experiments [considerable details of which are given]. In discussing control measures against these diseases, including crop rotation, field sanitation, and the avoidance of seed from diseased plants, it is stated that so far there is no evidence of varietal resistance to *Bact. solanacearum* in the tomato, and no varieties resistant to *F. lycopersici* have yet been determined in Trinidad [cf. ibid., xi, p. 356]. The other fungal diseases dealt with include leaf mould (*Cladosporium fulvum*) [ibid., x, p. 764; xi, p. 409], which in Trinidad occurs in the field and is most severe in sheltered positions; leaf spot (*Septoria lycopersici*) [ibid., x, p. 707], which is fairly common, but is rarely severe enough to cause much defoliation; *Phoma destructiva* [ibid., x, p. 414], which has been isolated from spots on leaves, stems, and fruits, and is prevalent in both the wet and the dry seasons, attacking mature plants, as well as causing considerable damage to seedlings in the nursery, in which it can kill most of the leaves and produce serious lesions on the stems; and mosaic, which at certain seasons of the year almost completely destroys the crop in small plots and gardens. The symptoms of mosaic in Trinidad are stated to vary considerably, one type consisting of a simple mottling of the leaves with little reduction in yield and another causing stunting, with considerable distortion and malformation of the leaves, and sterility. Symptoms resembling aucuba mosaic have also been noticed.

The fruit rots briefly described comprise those caused by a species of *Phytophthora* on tomatoes growing near or touching the ground; and by a bacillus closely resembling *Bacillus aroideae* [ibid., xi, p. 344], which appears to be a wound parasite, as experiments indicated that tomato fruits in the field are chiefly infected with it through the agency of various sucking insects (e.g. *Leptoglossus balteatus* and *Pthia picta*). During the dry season of 1931 over 50 per cent. of the diseased fruits tested yielded different strains or species of *Phomopsis*; in several instances the fungus was isolated from fruits immediately after picking, indicating that infection may occur in the field. Isolations from decaying tomatoes occasionally yielded *Phoma destructiva* and also a species of *Gloeosporium*, the parasitism of which was demonstrated. Species of *Fusarium* are commonly found on tomatoes showing signs of mechanical or physiological injury, but all the indications are that they are only secondary organisms.

WESTENBERG (J.). **Uit de historie van de Graphium-ziekte in de Iepen.** [Concerning the history of the *Graphium* disease of Elm.]—*Tijdschr. over Plantenziekten*, xxxviii, 4, pp. 61–66, 1932. [English summary.]

The designation of Dutch elm disease for the malady caused by *Ceratostomella* (*Graphium*) *ulmi* [*R.A.M.*, xi, p. 409] is regarded as misleading, since it is evident from Guyot's description of the symptoms that he observed in 1918 in northern France [ibid., xi,

p. 551] that the elm disease described by him was due to this organism, though attributed at that time to physiological factors. In 1930 the writer saw the elm disease in the Auvergne district of France, and *C. ulmi* was isolated by Prof. Westerdijk from infected twigs collected in that region. Since the country in which the trouble originated is unknown, the writer advocates the use of the now familiar term '*Graphium* disease of elms' in place of the incorrect and unjustifiable 'Dutch elm disease'.

D'OLIVEIRA (B.). **Apontamentos para o estudio de duas doenças do Sobreiro.** [Preliminaries for the study of two diseases of the Cork Oak.]—Reprinted from *Rev. Agron.*, Lisbon, xix, 2, 19 pp., 9 figs., 1931. [English summary. Received July, 1932.]

The inner bark of the cork oak (*Quercus suber*) along the banks of the Tagus is stated to be attacked by two fungi, namely, *Endothiella* (?) *gyrosa* Sacc., the agent of orange 'rust', and *Nummularia regia* (de Not.) Sacc. (*Hypoxylon regium* de Not.), causing 'coal disease'.

E. (?) *gyrosa* covers the affected area with an orange mycelium and closely adherent sclerotioid masses, often also involving the interstices of the cortex. The fungus is characterized by subglobose, ellipsoid, oval, or irregular pycnidia, up to 900 μ in diameter, with a pale yellow excipulum and an almost flat, subhysteroid ostiole; simple or sparsely branched, mostly curved, continuous, hyaline sporophores, up to 18 by 2·2 μ; and wreaths of straight, rod-shaped, isodiametric, continuous, biguttulate, hyaline pycnospores, rounded at both ends and measuring 3 to 4·5 by 0·6 to 1 μ. Latin diagnoses are given of this species, as well as of the closely related *Endothiella* stage (*Endothiella gyrosa* Sacc.) of *Endothia gyrosa* (Schw.) Fries and the pycnidial stage of *E. fluens* (Schw.) S. & S. Pending the development of the perithecial stage, the oak parasite cannot be definitely identified, but it appears to agree most closely with *Endothiella gyrosa*. Inoculation experiments with mycelium and pycnospores from pure cultures were most successful when carried out in April and May or October through wounds in the phelloderm of the trunk and branches, the incubation period ranging from three months to a year. Inoculation tests on other oaks (*Q. lusitanica*, *Q. toza*, and *Q. humilis*), chestnut (*Castanea dentata*), *Eucalyptus diversicolor*, and almond also gave positive results, while elm (*Ulmus glabra*), ash (*Fraxinus angustifolia*), and willow (*Salix viminalis*) failed to contract infection.

'Coal disease' is much more common than orange 'rust' and has been found attacking oaks, planes [*Platanus*], beeches, and chestnuts. The initial symptom of infection on the cork oak is a moist canker whence a dark excretion smelling of fermented tannin is exuded. On trees enfeebled by various causes the progress of infection is unusually rapid, destroying all the cork-producing zone, for which is substituted a hard, black, shiny substance of a stromatoid consistency, which gradually cracks the cortex and separates it from the trunk. A carbonaceous layer of stromatic fungal tissue may eventually cover, underneath the

cortex, the entire trunk and branches down to the smallest twigs. The round, shiny perithecia with numerous protuberances are clearly visible to the naked eye. Saccardo's Latin diagnosis of *N. regia* is given. Inoculation experiments gave positive results on wounded cork oaks, the incubation period being two to three months at the most.

Trees attacked by *E. gyrosa* should be decorticated and the trunk scorched, the implements being dipped after use in an antiseptic. In cases of severe infection by *N. regia* the trees should be burnt; local cankers may be excised and the resulting wound washed with a 5 per cent. solution of chloride of lime and then covered with a paste of linseed and copper dust, Bordeaux paste, or some similar material.

VANINE (S. I.). Грибные повреждения Бука (**Fagus orientalis**) и влияние их на качество древесины. [Fungal decays of the Beech (*Fagus orientalis*), and their effect on the quality of the wood.]—*Scient. Papers Inst. Engin. of Ways of Communication in Leningrad*, 111, 39 pp., 15 figs., 1932.

In this paper the author gives a brief account of the symptoms of the chief fungal rots that attack the beech (*Fagus orientalis*) in the Union of Soviet Republics, and also brief morphological descriptions of 24 species of Basidiomycetes usually found in association with these rots. Short diagnoses in Russian are further given of seven species of fungi that cause discoloration of beech timber, namely, *Bispora monilioides* Cda., *Stysanus stemonites* [cf. *R.A.M.*, xi, p. 80], *Bulgaria polymorpha* [ibid., viii, p. 425], *Lasiosphaeria hispida*, *Trematosphaeria hydrella*, *Roselinia ambigua*, and *R. pulveracea*. Considerable space is given to a discussion of the physical and mechanical properties of sound beech wood, and of those of the timber in various stages of decay.

SERVAZZI (O.). **Su una batteriosi del Pioppo canadense.** [On a bacteriosis of Canadian Poplar.]—*La Difesa delle Piante*, ix, 1, pp. 8–9, 1932.

A brief, popular account is given of a disease of Canadian poplars [*Populus canadensis*] noted in 1931 in Italy and which the author states is due to *Micrococcus populi* [*R.A.M.*, x, p. 567]. The condition affected the trunks of trees 3 to 5 years old and the young branches of adult trees. Rust-coloured spots measuring 6 to 10 by 4 to 6 cm. appeared in March, and the bark gradually swelled until soft tumours formed, which broke on pressure from the finger, emitting a colourless liquid containing bacteria. Later, the tumours cracked longitudinally and burst through the periderm, laying bare restricted areas of the cortical parenchyma and phloem and giving rise to elongated wounds [cf. ibid., x, p. 68], round which a cicatrization ring quickly formed; the affected bark turned brown and the surface of the wood became slightly yellow.

Usually, the first cicatrization ring suffices to arrest the progress of the disease, which is always restricted to limited portions of the bark, the wood being protected by cork which forms below the peripheral swelling. In a few cases, new swellings develop round

the original one, the wound becomes an open canker, and severely affected branches are killed.

As the disease usually quickly becomes arrested it need arouse no alarm. The external lacerations and tumours do not interfere with the growth of the trunk, and if the canker-like areas are small, after a few years they appear only as small, superficially cracked protuberances surrounded by a narrow ring.

Should the attack appear likely to become at all serious, the tumours should be promply removed, and the wounds disinfected with a 5 per cent. solution of iron sulphate, afterwards being painted over with tar.

FRANCHINI (G.). **Étude sur un flagellé spécial du latex d'un Figuier de l'Érythrée (Ficus hochstetteri (Mg.) A. Rich).** [A study of a specific flagellate of an Eritrean Fig (*Ficus hochstetteri*) (Mg.) A. Rich).]—*Bull. Soc. Path. Exot.*, xxiv, 9, pp. 843–848, 2 figs., 1931.

In the latex of *Ficus hochstetteri*, specimens of which were sent from Asmara, Eritrea, to the Institute of Colonial Pathology, Modena, the writer found a flagellate differing from other plant parasites of this nature in its greater length (up to 70 μ including the flagellum, by 0·7 to 1·5 μ broad). Aflagellate forms were also observed; they were oval or elongated, occasionally Leishmaniform (furnished with a nucleus and blepharoplast). The aflagellate forms were arranged in chains while the flagellates were isolated or occurred in groups of two or four with the posterior extremity in the centre and the anterior (flagellate end) free. Division originates in the blepharoplast and proceeds transversely instead of longitudinally, as in the majority of flagellates parasitic on plants. The organism is named *Herpetomonas* (*Leptomonas*) *ganorae* n. sp.

HUMPHREY (C. J.) & LEUS (SIMEONA). **Studies and illustrations in the Polyporaceae. II. Fomes pachyphloeus Patouillard and Fomes magnosporus Lloyd.**—*Philipp. Journ. of Sci.*, xlvii, 4, pp. 535–556, 10 pl., 1932.

Fomes pachyphloeus [*R.A.M.*, x, p. 165; xi, p. 106], the taxonomy and synonymy of which is discussed and the morphological characters fully described, is reported to be a vigorous wood-destroyer in the Philippines, where it is often found on dead standing trees and fallen trunks and occasionally produces an extensive heart rot in mature or over-mature living trees of the more perishable species. The following hosts have been identified in the islands: *Albizzia procera*, *Ficus* sp., *Hopea acuminata*, *H. philippinensis*, *Parashorea malaanonan*, *Parkia javanica*, *Pentacme contorta*, *P. mindanensis*, *Rhizophora candelaria*, *R. mucronata*, *Shorea guiso*, and *S.* sp.

HEMMI (T.). **Studies on some wood-destroying fungi attacking conifers in Japan.**—*Mem. Coll. Agric. Kyoto Imper. Univ.*, 20 (Phytopath. Ser., 5), 29 pp., 5 pl., 7 figs., 1932.

A comprehensive account is given of the author's morphological and physiological studies of conifer rots in Japan, of which three

types may be distinguished, viz., brown cubical rot, represented by *Fomes laricis* [*R.A.M.*, x, p. 571] on larch (*Larix leptolepis* and *L. dahurica*) and *Abies sachalinensis*, *F. pinicola* [ibid., x, p. 700] on *A. firma*, *Tsuga sieboldi*, *Pinus densiflora*, and other hosts, and *Polyporus schweinitzii* and *P. sulphureus* on *Abies*, *Picea*, *Pinus*, and *Larix* spp.; brown pocket rot (*F. ulmarius* on *Cryptomeria japonica*) [ibid., ix, p. 421]; and white pocket rot (*Trametes pini* on *A. sachalinensis*, *Picea jezoensis*, and *L. dahurica*, and *Polyporus orientalis* on *Pinus densiflora* and *P. thunbergii*) [ibid., viii, p. 210].

The examination of a specimen of *F. ulmarius* from an elm tree at Kew showed that the causal organism is identical with that causing the heart rot of *C. japonica* in Japan, while the whitish fruit bodies collected in various parts of Japan on *Aphananthe aspera*, *Celtis sinensis*, *Cinnamomum camphora*, and *Abelicea hirta* are also believed to belong to the same fungus.

Eades (H. W.). **British Columbia softwoods: their decays and natural defects.**—*Dept. of the Interior, Canada, Forest Service Bull.* 80, 126 pp., 60 pl. (18 col.), 3 figs., 17 diags., 1932.

This valuable monograph on the fungous rots and other natural defects of conifers in British Columbia is stated to be the result of insistent inquiries from the timber industry for comprehensive and graphic information concerning the appearance and importance of the various types of decay, staining, and blemishes encountered in the work of grading. As far as possible the text has been written in non-technical language. The subjects dealt with include the general anatomy and physiology of a tree; a description of British Columbian softwoods; wood-inhabiting fungi; the recognition of defects caused by stain and decay; a description of the chief wood-rotting fungi of the province; and the durability of coniferous timber.

The following organisms are responsible for damage to standing timber. *Trametes pini*, the cause of a white pocket rot of Douglas fir (*Pseudotsuga taxifolia*), spruce, pine, and other softwoods, is stated to be the most widespread of all the wood rots of North America [*R.A.M.*, x, p. 570 and next abstract], followed by *Polyporus schweinitzii*, known as the velvet top fungus or red-brown butt rot. The chalky quinine or larch fungus (*Fomes officinalis*) [*F. laricis*] attacks both standing trees of Douglas fir and western yellow pine (*Pinus ponderosa*) and also the timber from them, developing on bridge work, mine timbers, factory roofs, and the like. Most of the purple or red staining of Douglas fir heartwood is attributable to this fungus. *Polyporus sulphureus* causes a brown cubical rot which is most prevalent among the true firs (*Abies* spp.). The Indian paint or stringy brown rot fungus (*Echinodontium tinctorium*) also chiefly affects the true firs but is very severe on western hemlock (*Tsuga heterophylla*). Standing trees are seldom infected by the red-brown sapwood or belt rot due to *F. pinicola* which is, however, the chief cause of decay of 'down' timber or unused logs in the coastal region, where pines, Sitka spruce (*Picea sitchensis*), western larch (*Larix occidentalis*), Douglas fir, and western hemlock are all liable to attack. The rot

produced by *F. roseus* on Douglas fir and other conifers is similar to that caused by *Polyporus schweinitzii*. *F. annosus* is relatively unimportant on conifers in British Columbia as compared with the eastern part of North America or Europe, though all species are subject to occasional attack. Western yellow pine is frequently infected by *P. ellisianus*, known as red ray wood rot, red heart, red rot, grey rot, and top rot. *Ganoderma oregonense* [ibid., viii, p. 541], occurring along the Pacific coast from California to Alaska, causes a light, spongy, straw-coloured rot with numerous large, black spots and ramifying lines on Sitka spruce, Douglas fir, and western hemlock. Most of the butt rot in western red cedar (*Thuja plicata*) may probably be attributed to *Poria weirii*.

Notes are also given on some of the fungi found only on the timber after felling (not on the standing trees), and on the damage caused by sap-staining fungi.

Boyce (J. S.). **Decay and other losses in Douglas Fir in western Oregon and Washington.**—*U.S. Dept. of Agric. Tech. Bull.* 286, 59 pp., 11 pl., 2 figs., 11 graphs, 1 map, 1932.

Continuing his extensive studies on the causes of decay in the valuable Douglas fir (*Pseudotsuga taxifolia*) stand of the Pacific North-West, with special reference to fungous rots [*R.A.M.*, iii, p. 115], the author made a detailed examination of the losses sustained from 1921 to 1924, inclusive, on 38 plots covering 77·79 acres and containing 2,633 trees with a total volume of over 10,146,000 board ft. or 1,571,000 cu. ft. The results of the investigations [which are tabulated and discussed at length] showed that the total loss over the area under observation amounted to 27·77 per cent. in board ft. volume and 23·25 per cent. in cu. ft. volume, of which 16·99 and 9·50 per cent., respectively, were due to rotting.

Of the loss from decay, red ring rot (*Trametes pini*) [see preceding abstract] was responsible for 80·8 per cent. of the board ft. volume loss; brown trunk rot (*Fomes laricis*) for 8·6 per cent.; red-brown butt rot (*Polyporus schweinitzii*) for 6·2 per cent.; yellow-brown top rot (*F. roseus*) for 4·1 per cent.; and pitted sap rot (*Polystictus abietinus*), spongy sap rot (*F. annosus*), and unknown rots for 0·1 per cent. each. The corresponding figures calculated to the cu. ft. volume are given. The heaviest losses in any one plot amounted to 54·8 per cent. in board ft. volume and 32·2 per cent. in cu. ft. volume, nearly all caused by *T. pini*. The latter was observed attacking a 27-year-old tree, while *Polyporus schweinitzii*, *F. roseus*, and *F. laricis* occurred on individuals of 73, 76, and 146 years, respectively. Generally speaking, the incidence of decay was found to increase rapidly in mature and overmature stands, and data resulting from the present observations will find an important use in determinations of the correct periods for felling operations so as to save the maximum amount of mechantable timber.

Spaulding (P.) & Hansbrough (J. R.). **Cronartium comptoniae, the Sweetfern blister rust of Pitch Pines.**—*U.S. Dept. of Agric. Circ.* 217, 21 pp., 2 figs., 1 diag., 2 maps, 1932.

The sweetfern blister rust (*Cronartium comptoniae*) [*R.A.M.*, ix,

p. 145] of pitch pine (*Pinus rigida*) has been found to attack many two- and three-leaved pines in the United States and British Columbia, including *P. banksiana, P. contorta, P. echinata, P. jeffreyi, P. montana, P. nigra, P. ponderosa, P. pungens, P. resinosa, P. sylvestris, P. taeda,* and *P. virginiana.* It has caused serious damage in a number of nurseries in the northern States, and neither sweetfern (*Comptonia asplenifolia*) nor sweetgale (*Myrica gale*), another alternate host of the rust, should be tolerated within several hundred yards to a mile of pine plantings. *M. carolinensis* has been successfully inoculated with *C. comptoniae* but does not appear to contract infection in nature.

Ohara (K.) & Adachi (K.). **Über die Zersetzung der Holzzellwände durch Pilzfäden.** [On the dissolution of the cell walls of wood by fungus hyphae.]—*Bot. Mag.*, Tokyo, xlvi, 544, pp. 345–352, 1 fig., 1932. [Japanese, with German summary on pp. 262–263.]

No topographical modification of the cell wall structure near the points of entry of the hyphae could be detected in the wood of *Picea jezoensis* attacked by *Trametes pini* (white pocket rot) and of *Cryptomeria japonica* infected by *Fomes ulmarius* (brown pocket rot) [see above, p. 614] on staining with chlorzinc iodine, sulphuric acid and iodine, or phloroglucin-hydrochloric acid. Oxamin 4 R stains the marginal zone blue and the remaining portions of the cell walls red in both cases, indicating that the submicroscopic structure of the cell wall undergoes a change near the points of entry of the hyphae.

Vanine (S. I.). Синева древесины и меры борьбы с нею. [Blue stain of timber and measures for its control.]—104 pp., 48 figs., Гос. издат. С.-хоз. и Колхозно-Коop. Литературы. [State Publishing Office of Agric. and Collective Farming Co-operative Literature], Leningrad, 1932.

This is a monograph, compiled from Russian and foreign researches, of the various fungi associated with the so-called blue staining of timber in the northern hemisphere. Of the 42 species briefly described and illustrated, the following appear to occur within the Russian Soviet Republics [cf. *R.A.M.*, x, p. 143], namely: *Ceratostomella buxi* on boxwood [*Buxus* sp.]; *C. castaneae* on chestnut, oak, and beech; *C. coerulea, C. piceae,* and *C. pini* on conifers; *Lasiosphaeria spermoides* on the wood of broad-leaved trees; *Rosellinia abietina* var. *trichota* on coniferous timber; *R. pulveracea* on broad-leaved species, especially oak timber; *Aposphaeria petersii,* found sporadically on telegraph poles; *A. pinea,* frequent on standing dead pines killed by forest fires and causing a deeply penetrating bluish-grey discoloration of their wood; *Ligniella pinicola* on windfalls of coniferous trees; *Coniothyrium dispersellum* on pines and firs; *Cladosporium herbarum* on coniferous timber; *Hormiscium antiquum* on birch and other deciduous timber; *Hormonema dematioides* very frequent on pine and fir logs kept for a long time in the forests; *Sirodesmium granulosum* on old chestnut and other deciduous timber; *Sporodesmium cladosporii* on coniferous wood; *Trichosporium ligni-*

colum on pinewood; and *T. tingens* very frequent on aspen timber.

The remainder of the paper is a summarized account of the behaviour of the various fungi under natural and controlled conditions, and of the damage done by them to timber. Control measures, most of which are of a preventive nature, are discussed in considerable detail, and recommendations are given for the handling of the logs from the time of their felling to their industrial application.

CUMMINS (J. E.). **The preservative treatment of fence posts. (With particular reference to Western Australia.)**—*Australia Council Sci. & Indus. Res. Pamphlet* 24, 34 pp., 8 figs., 1932.

After a reference to the increasing shortage in Australia of hardwood timber for fencing purposes, the author briefly describes in popular language the chief preservative treatments of the more perishable kinds of fence poles. The methods of treatment discussed are the pressure, open tank, steeping, dipping, and brushing processes, of which the open tank method is recommended as the most suitable [*R.A.M.*, xi, p. 488]. Among the various types of preservatives described, creosote with fuel oils is stated to be the best for use in the wetter localities, besides being easier and simpler to apply than water-soluble preparations. The latter, e.g., sodium fluoride with white arsenic [arsenious oxide], or zinc chloride with white arsenic, give good service in drier localities, their choice being a question of price and availability. Although no data are yet available regarding the useful life of treated fence posts for the species of timber existing in Western Australia, there are reasons to believe that properly creosoted posts will last at least 20 to 25 years, and posts treated with the water-soluble preservatives will give a life closely approximating this in dry places. Tables are given indicating the cost of the treatments for various species of timber, and it is computed that if for an untreated post costing 2*d.* to cut and 1*s.* to set, and lasting seven years, the cost per year of life is about 2½*d.*, this charge will be reduced to about 1½*d.* per year for a creosoted post lasting 20 years, and to about 1¾*d.* for a post treated with either of the water-soluble preparations and lasting 15 years.

RAMSEY (G. B.) & LINK (G. K. K.). **Market diseases of fruits and vegetables: Tomatoes, Peppers, Eggplants.**—*U.S. Dept. of Agric. Misc. Publ.* 121, 44 pp., 11 col. pl., 1932.

In this, the second paper of this series [*R.A.M.*, xi, p. 467], the authors deal on the same lines as in the previous one with the parasitic diseases of tomatoes, peppers (*Capsicum annuum*), and eggplants in the United States. The bibliography appended comprises 115 titles.

ZAUMEYER (W. J.). **Comparative pathological histology of three bacterial diseases of Bean.**—*Journ. Agric. Res.*, xliv, 8, pp. 605–632, 16 figs., 1932.

This is the full account, of which an abstract has already been

noticed [*R.A.M.*, x, p. 422], of the author's comparative study of the histological lesions caused in the bean (*Phaseolus vulgaris*) by bacterial blights, namely, *Bacterium flaccumfaciens*, *Bact. phaseoli*, and *Bact. medicaginis* var. *phaseolicola* [see next abstract].

PITTMAN (H. A.). **Bacterial blight of Beans. Disease-free seed and disease-free soil essential for control.**—*Journ. Dept. Agric. Western Australia*, 2nd Ser., ix, 1, pp. 144–148, 2 figs., 1932.

This is a brief popular account of the etiology and control of the bacterial blight of French beans (*Phaseolus vulgaris*) in Western Australia which was first observed there in 1930–31, since when it has spread to a dangerous extent. Although the causal organism has not yet been definitely established, it appears probable that at least the major part of the losses is attributable to *Phytomonas* [*Bacterium*] *medicaginis* var. *phaseolicola* [*R.A.M.*, xi, p. 418 and preceding abstract].

SCHREIBER (F.). **Resistenzzüchtung bei Phaseolus vulgaris.**] [Breeding for resistance in *Phaseolus vulgaris*.]—*Phytopath. Zeitschr.*, iv, 4, pp. 415–454, 1932.

A full account, supplemented by 45 tables, is given of the author's experiments at the Halle Plant Breeding Institute in the development of bean (*Phaseolus vulgaris*) varieties resistant to *Colletotrichum lindemuthianum* [*R.A.M.*, xi, p. 277].

Twenty plants of each of 57 bush bean varieties were inoculated with 53 isolations of the fungus. Each lot comprised 1,140 plants, a total of 60,420 of which were thus tested. Further, 5,520 F_3 and 1,032 F_2 plants were examined for their reaction to the fungus. Thirty-four physiologic strains of *C. lindemuthianum* were differentiated on the basis of these trials and classified in three main groups (shown by a key), each of which contains one of the American strains of Barrus and Burkholder [ibid., iii, p. 110]. About half the tested varieties were completely susceptible, while of the remainder the Sugar Pearl beans were conspicuous for their resistance. The Cornell selection 'Anthracnose-resistant dry shell Pea Bean No. 22' proved immune from 30 of the *C. lindemuthianum* strains tested, and highly resistant to the other four.

The inheritance of resistance to the bean anthracnose organism is on the basis of three main genes, one for each of the main strain groups of the parasite. Crosses between completely susceptible and completely resistant varieties segregate in the F_2 on testing with one group of physiologic strains in monomerous fashion as 3 : 1, with two groups in dimerous (9 : 7), and with all three groups in trimerous (27 : 37). The combination of resistance to anthracnose with various desirable qualities of colour, shape, and habit of growth was found to be quite practicable.

BRUNER (S. C.) & ARANGO (O.). **La enfermedad 'verruga' de las Habas de Lima.** [The 'scab' disease of Lima Beans.]—*Cuba Sec. Agric., Com. y Trab., Estac. Exper. Agron. Circ.* 74, 38 pp., 4 pl. (1 col.), 1 graph, 1931.

Scab (*Elsinoe canavaliae*) of Lima beans (*Phaseolus lunatus*) is

stated to have been present in Cuba [*R.A.M.*, x, p. 701] for at least 15 years, but for some time it was confused with anthracnose [*Colletotrichum lindemuthianum*: ibid., ix, p. 756]. Counts made on 225 plots of the most commonly grown Challenger beans from November, 1930 to 7th April 1931, showed that the average incidence of infection during this period was about 58 per cent., the figures for each month being as follows: November 9 per cent., December 7, January 36, February 94, March 98, and April 95. The rainfall in December, when infection was lowest, was only 34·8 mm., compared with 103·9 mm. in March, when the disease reached a climax; the mean temperature was approximately 21° C. in both months. There seems to be no appreciable difference in the reaction to scab of the Challenger (pole) and the Fordhook (bush) varieties, the two kinds grown in Porto Rico. The only other plant found infected by *E. canavaliae* is the indigenous or naturalized wild Lima bean.

FIFE (J. M.). **A method of artificially feeding the Sugar-Beet leafhopper.**—*Science*, N.S., lxxv, 1948, pp. 465–466, 2 diags., 1932.

Carter's apparatus for the artificial feeding of the sugar-beet leafhopper (*Eutettix tenella*) [*R.A.M.*, viii, p. 83] having proved unsuitable for certain biochemical investigations of the curly top problem, a method was devised whereby small amounts of solutions of known composition were dropped on to the outside of paraffin membranes, cut into sections 60 μ in thickness, at one end of a piece of glass tubing, the other end of which was covered with cheese-cloth so that the tube served as a cage for the insect, which was found readily to feed on the drop through the paraffin membrane. Hydrogen-ion determinations made on a large number of leafhoppers showed that the material injected into the drop of liquid by the insect is very alkaline. Moreover, a drop of thymol blue (made acid) would turn from lemon yellow to deep green and in some cases to blue within three minutes after the leafhoppers started to feed. A special contrivance [details of which are given] was also arranged to facilitate the study of a coagulable material ejected by the leafhoppers during the feeding process.

TAVEL (CATHERINE V.). **Zur Speziesfrage bei einigen Alliumbewohnenden Uredineen.** [On the species question in some Uredineae occurring on *Allium*.]—*Ber. Schweiz. Bot. Gesellsch.*, xli, 1, pp. 123–170, 2 pl., 7 graphs, 1932.

This is an expanded account, accompanied by 28 tables, of the author's studies on the taxonomy and biology of three autoecious Uredineae occurring on *Allium* spp., viz., *Puccinia allii*, *P. porri*, and *Uromyces ambiguus*, a preliminary note on which has already appeared [*R.A.M.*, x, p. 153].

GÖLLNER (J.). **A Colletotrichum lagenarium egyik új alakjáról.** [On a new stage in the life-history of *Colletotrichum lagenarium*.]—*Bot. Közlemén.*, xxix, 1–4, pp. 73–75, 1 fig., 1932. [German summary.]

The writer's detailed investigations on the life-history of *Colletotrichum lagenarium* [see next abstract] showed that the fungus

penetrates the epicarp of the melon through a wound, spreads intercellularly through the mesocarp, and proceeds to form a sporiferous stroma. Meanwhile the substromatal mycelium continues to develop and rises left and right as if to envelop the stroma, which constantly thickens with the formation of new conidiophores. This encircling mycelium is profusely developed and of a vivid brown colour, extending more than half way up the stroma, the upper part of which is thereby contracted and almost covered in. Hence the originally parallel conidiophores converge and the conidial layer is transformed into a pseudopycnidium, with an opening through which are discharged the abundant conidia. The pore may reach a quarter, a third, or half the diameter of the pseudopycnidium. The latter, like the free conidial layers, contains sterile hyphae (setae). The pseudopycnidia project from the epidermis more than the stromata, even before opening.

The pseudopycnidium is regarded as a stage in the life-history of *C. lagenarium* with the specific purpose of facilitating the rupture of the epidermis and thereby promoting the rapid liberation of the conidia. The organ in question was more commonly found in melon varieties with a thick cuticle than in thin-skinned ones which rupture more readily. The sheath of the pseudopycnidium measures 4·8 to 7·1 μ in thickness, and the diameter of the pseudopycnidia is 97 to 117 μ, height 78 to 146·3 μ, pore 39 to 68·3 μ.

GÖLLNER (J.). **Über die Anthracnose der Melone.** [On anthracnose of the Melon.]—*Thesis*, Debrečen, 40 pp., 2 pl., 1930. (Hungarian.) [Abs. in *Bot. Centralbl.*, N.F., xxi, 3–4, pp. 112–113, 1932.]

The anthracnose of melons due to *Colletotrichum lagenarium* [*R.A.M.*, xi, p. 422 and preceding abstract] is most destructive in Hungary on the fruit of thin-skinned varieties growing in loose, sandy soils; the disease is favoured by a low temperature (12° to 14° C.). The incubation period is 4 to 5 days when the skin is wounded, 8 to 10 when uninjured. The conidia retained their infective capacity after exposure to a temperature of 0° during the winter. Conidia from sugar melons infected watermelons and vice versa. The fungus grows intercellularly below the epidermis of the affected organs; pycnidia and sclerotia of the type described by Rodigin [ibid., viii, p. 624; ix, p. 759] were not observed by the writer. It is injurious not only as a primary parasite but also as preparing the way for *Fusarium niveum* [ibid., xi, p. 557]. Conidial germination was most profuse in distilled water or 1·2 per cent. agar with 3 per cent. dextrose or melon extract (P_H 5 to 7·3).

KORDES (H.). **Sclerotinia sclerotiorum und Botrytis cinerea an Treibhausgurken.** [*Sclerotinia sclerotiorum* and *Botrytis cinerea* on greenhouse Cucumbers.]—*Prakt. Blätter für Pflanzenbau und Pflanzenschutz*, x, 1–2, pp. 20–23, 3 figs., 1932.

Greenhouse cucumbers of the Spotfree and Spiers varieties at Neustadt-an-der-Haardt, Germany, were severely attacked in

March, 1931, by *Sclerotinia sclerotiorum* [*R.A.M.*, iv, p. 323; vi, p. 457; viii, p. 155], which destroyed the cortical tissues and vascular bundles of the stem for a distance of 5 to 10 cm. above soil level, covering the affected part with a dense, white mycelium. The supply of water to the upper portions of the plant was thus interrupted and complete wilting ensued. Infection spread rapidly in consequence of the excessively high temperature and stagnant humid atmosphere of the greenhouse. By cutting off the diseased parts of the stem and the application of tree wax to the wounds it was possible to retard the death of the plants for a considerable time, and in mild cases further injury was entirely obviated by this treatment. In the same block the fungus occurred also on the young fruits, which turned yellow and wilted. Numerous sclerotia developed within a few days at 18° C. No genetic connexion could be traced between *S. sclerotiorum* and *Botrytis cinerea*, which occurred extensively on the fruits in the same house.

Miller (J. H.) & Harvey (H. W.). **Peanut wilt in Georgia.**—*Phytopath.*, xxii, 4, pp. 371–383, 3 figs., 1932.

Investigations were conducted in 1931 to determine the identity of the fungi responsible for a very common wilt of groundnuts in Georgia. *Fusarium martii* var. *phaseoli* [*R.A.M.*, x, p. 161], apparently not hitherto recorded on this host, was found to be the agent of a seedling wilt that depleted the stand by 10 to 38 per cent. in Clay and Early counties.

Bacterium solanacearum [ibid., x, p. 775] causes a wilt of young plants but in older plants the term 'yellows' is more descriptive of the results of infection by this organism. If the attack is severe the plants may be killed. *Diplodia natalensis* may be found in association with a collar and root rot in fields infected by *Bact. solanacearum*, but all inoculations with it failed. *Sclerotium rolfsii* is a common cause of root and stem rot, especially rather late in the season. It also attacks and rots the nuts, and appears to be most severe in fields much affected by early wilt on sandy lands. The best method of control of these diseases appears to be the cultivation of varieties resistant to *Bact. solanacearum* and *S. rolfsii*, e.g., Alabama Runner, in place of the susceptible White Spanish.

Kufferath (H.) & Ghesquière (J.). **La mosaïque du Manioc.** [Cassava mosaic.]—*Comptes rendus Soc. de Biol.*, cix, 12, pp. 1146–1148, 1932.

Previous investigations by the second-named author showed the presence in the Belgian Congo of a mosaic disease of cassava (*Manihot utilissima*), and also of *M. aipi* and *M. glaziovii* [*R.A.M.*, ix, p. 19; xi, p. 20; see also ibid., xi, p. 152]. The disease was found to be transmissible by Aleyrodideae, and healthy cuttings at the Laeken (Brussels) Colonial Garden were successfully inoculated with sap from the mosaic plants.

[Uppal (B. N.).] **Grape diseases in the Bombay Presidency.**—*Bombay Dept. of Agric. Leaflet* 8 of 1931, 4 pp., [? 1931. Received June, 1932].

Popular notes are given on the symptoms of the following diseases

affecting grapes in the Bombay Deccan: downy mildew (*Plasmopara viticola*], powdery mildew [*Uncinula necator*: *R.A.M.*, ix, p. 505], and anthracnose [*Gloeosporium ampelophagum*]. The problem of control is practically restricted to *U. necator*, since the other two fungi mentioned suffer from the long periods of drought that occur during the fruiting season of the grape in the district in question. Experiments have shown that the best time for 'cold weather' pruning is the first fortnight of October, while four applications of a fungicide should ensure a satisfactory yield, Bordeaux mixture 5–5–50 being given when the shoots are 6 to 8 in. long, sulphur dust (20 lb. per acre) two to three days after the mixture has dried on the leaves, and the same at the rate of 30 lb. per acre at the time of blossoming and again about forty days later.

MEYER (A.). **Sur l'emploi des colorants et de diverses substances organiques dans la lutte contre les maladies cryptogamiques, en particulier le mildiou de la Vigne.** [On the use of dyes and various organic substances in the control of cryptogamic diseases, particularly Vine mildew.]—*Rev. de Vitic.*, lxxvi, 1970, pp. 197–202, 1932.

In this paper the author briefly indicates the results of a series of preliminary experiments carried out in 1930, on his instigation as an outcome of Truffaut's and Pastac's recent investigation of the fungicidal action of chemical dyes [*R.A.M.*, x, p. 432; xi, pp. 221, 525], by some vine-growers of the Côte-d'Or on the control of vine mildew [*Plasmopara viticola*]. The following dyes were tested: malachite green, brilliant green, rhodamine B, safranin, acridine yellow, auramine, and yellow pyoctanine. Tests of quinosol [cf. ibid., viii, p. 588; x, p. 138] and sunoxol of the oxyquinoline group of organic substances were also made. While pointing out the provisional nature of the results, particularly in view of the severity of the outbreak of mildew in that year which in some cases masked the efficacy of the treatments, it is stated that of the dyes the best curative effect was obtained with auramine, pyoctanine, acridine yellow, and safranin, the first two also having apparently given the best protection to the vine foliage against the fungus, since vines treated with them remained free from the disease longer than neighbouring plots that had been sprayed several times with cupric preparations. Particularly promising results were obtained with quinosol and sunoxol, both of which were effective as prophylactic and curative remedies at much higher dilutions than the dyes. The spreaders used with all the substances were either brecolane N of the Établissements Kuhlmann or oranit BX of the Établissements Beycopal.

RAVAZ (L.). **Chronique. Le mildiou.** [Current events. Mildew.] —*Prog. Agric. et Vitic.*, xcvii, 16, p. 381, 1932.

The heavy rains (5 to 24 mm.) which fell between the 1st and 4th April, 1932, in combination with temperatures ranging up to 20° C., in the region of Montpellier caused, in exposed places, a very abundant germination of the winter spores of vine mildew [*Plasmopara viticola*]. These observations led the Agricultural

College of Montpellier on the 7th April to issue a warning of an impending outbreak of the disease towards the 13th or 14th of that month, especially in low-lying vineyards flooded by the rains, and on vinestocks trained low. It is pointed out that, with the exception of 1931, when the first wave of infection occurred on the 1st of April, this is the earliest invasion of the fungus so far recorded in the region.

RAVAZ (L.). **Chronique. Sur la pourriture grise précoce.** [Current events. Note on early grey rot.]—*Prog. Agric. et Vitic.*, xcvii, 16, pp. 377–380, 1932.

The author states that the examination early in 1932 of a small lot of dormant vine runners (variety Pinot) from Champagne showed that, besides the presence of fructifications of common saprophytic fungi, the twigs presented pale yellow or almost white discolorations of the cortex, occasionally bearing sclerotia. When placed under adequate conditions of humidity and temperature, these spots were rapidly covered with an abundant aerial mycelium, at first white but later turning brown, and indubitably belonging to *Botrytis cinerea*. Although the fungus apparently did no serious injury to the twigs, its presence on the latter is a dangerous source of infection to young developing shoots, which, especially in wetter areas, such as the north-east, centre, and south-west of France, are sometimes severely attacked by it during rainy spells; the vine inflorescences may also be infected from their very inception and until the end of the flowering period, with consequent partial or total destruction of the racemes. Laboratory experiments indicated that the fungus may be removed from the twigs by swabbing or spraying them, while still dormant, with a 10 per cent. sulphuric acid or a 40 per cent. sulphate of iron solution.

PRESTON (N. C.). **Part I. Report of the Advisory Mycologist, April, 1931–March, 1932.**—*Rept. Advisory Dept. Harper Adams Coll., Newport, Salop*, 7, 30 pp., 1 fig., 1932.

Root rot (*Aphanomyces euteiches*) [*R.A.M.*, x, p. 422], which was first recorded on peas in Warwickshire during 1929–30, caused extensive damage in the year under review in the Avon Valley, and was observed on one field crop in Shropshire. *Thielavia basicola* was also reported as a cause of failure in garden peas [ibid., viii, p. 622].

Seedling oats were severely damaged by *Fusarium culmorum* and *F. avenaceum* [ibid., ix, p. 586; x, p. 784], while an ear blight of wheat, also caused by a species of *Fusarium*, was injurious locally.

Verticillium vilmorinii [ibid., iv, p. 289; x, p. 758] caused exceptionally heavy damage on Michaelmas daisies in Staffordshire.

The effect of the application of hydrated lime on small plots at the rate of 2 tons per acre (which brought the soil reaction slightly above P_H 7) on finger-and-toe [*Plasmodiophora brassicae*] in turnips was to increase the average weight of the crop per plot from 5·2 to 68·3 lb. while the percentage of badly diseased roots was reduced from 70 to 46.

Zpráva o škodlivých činitelích kulturních rostlin v Republice Československé v roce 1930–1931. [Report on the agencies injurious to cultivated plants in the Republic of Czecho-Slovakia in the year 1930–31.]—*Ochrana Rostlin*, xii, 1–2, pp. 1–63, 5 figs., 1 graph, 1932.

In this series of annual reports of the diseases of the chief agricultural crops in Czecho-Slovakia [cf. *R.A.M.*, xi, p. 157] Šeda states that early in the spring of 1931 cereals suffered very heavily from the so-called winter injury (*Fusarium* spp.), more particularly in hilly districts where the snow covering was deep and was late in disappearing; in some localities so many of the seedlings were killed that whole fields had to be resown. There was good evidence that crops raised from disinfected seed were considerably less injured than where this precaution was neglected. The year under review was also conspicuous for a high incidence and severity of cereal smuts, especially wheat bunt (*Tilletia tritici*) [*T. caries*], the development of which was favoured by the climatic conditions of the year which retarded the early growth of the seedlings.

Baudyš states that in Moravia considerable damage was done to red clover [*Trifolium pratense*] by *Fusarium trifolii* [ibid., x, p. 670], this being believed to be its first record for Czecho-Slovakia. In several localities of Moravia lucerne suffered from attacks of *Pionnotes rhizophila* [*F. betae* = *F. merismoides* var. *majus*] on its roots, and peas from attacks of *F. redolens* [ibid., iv, p. 10]. In Silesia, following heavy and frequent rains in August, French beans [*Phaseolus vulgaris*] were severely attacked by *Botrytis cinerea* which not infrequently killed the plants; in Bohemia this crop was chiefly attacked by *F. vasinfectum*, and lupins by a species which is believed to be *F. tracheiphilum*.

Blattný reports a considerable reduction in 1931 in the incidence of the 'kadeřavost' disease of hops [ibid., x, p. 207], and also the entire disappearance of hop mosaic, a few cases of which had been observed in certain commercial hop gardens in Czecho-Slovakia. An infectious sterility of hops (the infectivity of which is not considerable) was rather prevalent in certain localities, and investigations of the disease are in progress. Among the diseases of ornamental plants the following may be mentioned; *Entyloma dahliae* on dahlias [ibid., ix, p. 409]; *Oidium chrysanthemi* on chrysanthemums [ibid., ix, p. 456]; a black stem rot of asters (*Callistephus chinensis*) caused by several species of *Fusarium*, of which *F. pyrochroum* and *F. conglutinans* var. *callistephi* appear to be the most frequent; *Puccinia arenariae* [ibid., x, p. 745] on carnations (*Dianthus barbatus*); and mosaic of hyacinths imported from Holland.

Annual Report of the Department of Agriculture, Jamaica, for the year ended 31st December, 1931.—36 pp., 3 pl., 1932.

The following items of phytopathological interest occur in this report. H. H. Cousins states (p. 2) that in 1930 the annual rate of increase of Panama disease [*Fusarium oxysporum*: *R.A.M.*, x, p. 626] in banana plantations was reduced to 100 and in 1931 to 31 per cent. as compared with 115 per cent. in 1929, the latter abnor-

mally high figure being attributed mainly to the widespread adoption, on outside advice, of the 'one-root' treatment [ibid., x, p. 44]. During the three years previous to 1929 the rate of increase had remained steady at 57 per cent. per annum. Had the continuation of the 'one-root' system been permitted in 1930, it is estimated that the diseased plants would have numbered over a million in 1931, and the reduction of the premier industry of Jamaica to a low standard would have been imminent. For 1932 the estimated number of diseased plants requiring treatment is 130,000, at a cost of £15,333. The discovery by the Microbiologist (F. E. V. Smith) of the efficacy of certain grades of fuel oil in killing banana plants *in situ* is calculated to have reduced the cost of treating Panama disease by about 50 per cent. [ibid., xi, p. 585]. On the Ballards Valley estate the cost of treating 182 cases by the old method of digging out and burning in 1930–1 was 5*s*. 11½*d*. each, against 2*s*. 1¾*d*. for 535 cases by the fuel oil (p. 18). A large number of seedling bananas immune from *F. oxysporum* have been produced and some have already gained commercial acceptance; each time the plants ratoon the fingers become longer and the bunches larger. The most successful crosses, according to J. B. Sutherland (p. 21), are the Gros Michel-Robusta and back-crosses of these to Gros Michel [ibid., xi, p. 25]. It is stated in F. E. V. Smith's report (p. 17) that as a result of the withdrawal of Government control in the Portland district in 1930 [ibid., xi, p. 62], the treatment of bananas against Panama disease was almost completely discontinued, with a consequent rapid increase of infection.

The 'pin-head' black spot was prominent on irrigated banana fruits during the autumn, when a similar spotting was also prevalent in some mountainous districts. These disorders appear to be associated with fluctuations in soil moisture and temperature.

Various types of root disease and gummosis of citrus are common throughout the Island. Reasonably good control of scab (*Sporotrichum citri*) in sour orange [*Citrus aurantium* var. *bigaradia*] nurseries has been given by spraying with Bordeaux mixture [ibid., xi, p. 25], coupled with the eradication of all old sour orange and lemon trees from the vicinity. Knot (*Sphaeropsis tumefaciens*) is common on limes [ibid., ix, p. 63].

A rotting of pineapple plants at soil level appears to be due to *Phytophthora parasitica* [ibid., x, pp. 24, 473].

Mangoes were heavily damaged by mildew (*Oidium* sp.) [? *Erysiphe cichoracearum*: ibid., x, p. 326] attacking the young flowers.

A number of avocado trees in the mountains were killed by black root rot (*Rosellinia* spp.) [ibid., viii, p. 632], while one case of severe leaf infection by *Sporotrichum citri* [*Sphaceloma* sp.: ibid., v, p. 310; ix, p. 726] was recorded.

Mosaic seems to be the limiting factor in the cultivation of papaws on a large scale on the Liguanea Plain [ibid., x, p. 809].

Leaf mould (*Cladosporium fulvum*) and late blight (*P. infestans*) of tomatoes were both prevalent, the latter yielding only to repeated applications of Bordeaux mixture.

The mosaic-immune Java cane P.O.J. 2725 is stated by H. H. Cousins (p. 2) to be rapidly replacing Uba [cf. ibid., xi, p. 603].

MARTIN (W. H.). **Plant pathology.**—*Fifty-second Ann. Rept. New Jersey Agric. Exper. Stat. for the year ending June 30, 1931*, pp. 47–52, 307–316, 1931. [Received July, 1932.]

In a field experiment to determine the relative value of various chemical compounds in the control of potato scab (*Actinomyces scabies*) and *Corticium vagum* [*C. solani*: *R.A.M.*, xi, p. 355] equally good results against the former disease were given by semesan at the rate of 45 lb. per acre and calomel or yellow oxide of mercury, 10 lb. per acre. The two latter compounds were also very effective against *C. solani*. Further investigations to ascertain the effect of varying amounts of lime on the development of scab showed that, in those soils where the fungus has been eliminated by increasing the soil acidity, the addition of lime in quantities sufficient to bring the reaction to a point above P_H 5·3 (3,000 to 4,000 lb. per acre) will result in a scabby crop.

Sweet potatoes from a field severely infested by scurf (*Monilochaetes infuscans*) [ibid., x, p. 403] were divided into three lots, viz., apparently clean, slightly diseased, and heavily infected. Part of each lot was bedded without treating, while the remainder was either immersed for ten minutes in 1 in 1,000 mercuric chloride or for two minutes in 1 in 48 semesan. At the first pulling of sprouts 8·8 per cent. were clean from the untreated clean lot compared with 45·4 per cent. from the untreated slightly and severely infected. At the second pulling the number of clean sprouts from the three lots was 39·1, 25·7, and 27·8 per cent., respectively. On the slightly diseased treated potatoes there was an increase of some 53·3 per cent. in the number of clean sprouts as compared with the untreated, the corresponding figure for the severely infected being 10 per cent.

The pea root rot organism (*Aphanomyces euteiches*) [see above, p. 623] was found to require a minimum soil temperature of about 60° F. and abundant moisture for infection.

The relationship between neutral soils and eggplant wilt (*Verticillium albo-atrum*) was again demonstrated [ibid., x, p. 438]. On acid plots (P_H 4·6 to 4·8) the yield of marketable fruits was 32 per cent. higher than that from limed plots. On the acidified plots 31·2 per cent. of the plants remained free from wilt, compared with 22·9 on the untreated and 1·4 per cent. on the limed.

Partial control of apple scab (*Venturia inaequalis*) on Rome trees was given by spraying with copper oleate and copper hydroxide, but the results were not comparable with those obtained with the standard fungicides tested. Over 90 per cent. of the apples treated with lime-sulphur and flotation sulphur were placed in the first grade.

Observations in ten orchards in Hunterdon County showed an increase in the incidence of peach yellows [ibid., xi, p. 521] of 5 to 40 per cent. in 1930 compared with 1929.

Good control of anthracnose (*Plectodiscella veneta*) on dewberries [*Rubus* sp.] was given by a delayed dormant application of concentrated lime-sulphur 1 in 10, followed by a pre-blossom spray of Bordeaux 2½–5–50, which reduced the incidence of infection from 90 to 10 per cent.

Six strains of *Phytophthora cinnamomi* [ibid., x, p. 12] have

been studied in relation to rhododendron wilt. Two of the strains are decidedly less pathogenic on *Rhododendron ponticum* than the other four, and one of the two has distinct growth characteristics on certain media. Of all the materials used for soil treatments against this disease, the most promising are copper carbonate and inoculated sulphur.

STEIN (EMMY). **Über den durch Radiumbestrahlung von Embryonen erzeugten erblichen Krankheitscomplex der Phytocarcinome von Antirrhinum majus.** [On the hereditary disease complex of the phytocarcinoma of *Antirrhinum majus* induced by radium irradiation of embryos.]—*Phytopath. Zeitschr.*, iv, 5, pp. 523–538, 7 figs., 1932.

An account is given of the writer's genetic and histological studies of four generations of the progeny of an *Antirrhinum majus* embryo in which a disease was induced by exposure to radium rays. From the standpoint of heredity the disease is complex, several hereditary factors for pathogenic processes being apparently involved and becoming manifest in succeeding generations. One of these (which proved to be recessive) has been separated by crossing the diseased progeny with the healthy parent race and is termed 'ca_1' (carcinoma).

The first perceptible symptoms of this systemic disease consist of more or less pronounced degenerative changes in the embryonal and post-embryonal tissues, including the development of giant cells, considerable cytological details of which are given. Any organ may be affected by these alterations, the course of which is rapid and their final result disintegration.

The analogy between these plant 'carcinomata' and those of man and animals rests on the following bases: (1) identity of cellular development; (2) experimental production of similar degenerative changes in plants and animals by the same means (rays with short wave-lengths and tar); (3) the existence of a chromosomal basis as shown by the hereditary analysis of the irradiated *Antirrhinum*. It is concluded that many types of malignant neoplasms, both in the plant and animal kingdoms, rest on the same hereditary bases.

WENIGER (WANDA). **Diseases of grain and forage crops in North Dakota.**—*North Dakota Agric. Exper..Stat. Bull.* 255, 97 pp., 31 figs., 1932.

This is a revision of Bulletin 166 dealing in popular terms with the diseases of cereals and forage crops in North Dakota and their control [*R.A.M.*, ii, p. 498].

SHITIKOVA-ROUSSAKOVA (Mme A. A.). Особенности распространения спор в воздухе, главным образом спор ржавчины хлебов. [Peculiarities in the dissemination of spores through the air, with particular reference to cereal rust spores.]—*Bull. Plant Protection*, Leningrad, v, 1, pp. 131–140, 2 graphs, 1932. [English summary.]

This is a somewhat amplified version of the author's recent paper on the influence of air currents on the spread and development of cereal rusts on the territory of the Russian Soviet Republics [*R.A.M.*, xi, p. 286].

Shitikova-Roussakova (Mme A. A.). Влияние пересадки растений озимой Ржи и Пшеницы на развитие ржавчины. [The influence of transplantation of winter-sown Rye and Wheat plants on the development of rust.]—*Bull. Plant Protection*, Leningrad, v, 1, pp. 85–96, 1932. [English summary.]

The experiments described in this paper were designed primarily to determine the effect of transplantation on, and the relationship of density of stand to, the yield and quality of cereal crops, with particular reference to wheat and rye. The investigation, which was carried out during the 1929–30 season in several widely separated regions of Russia, showed that transplantation in the spring of winter-sown rye and wheat plants, by prolonging the period of their early growth, rendered them more susceptible to attacks of rusts [*Puccinia* spp.]; transplantation by mechanical means (Blass transplantor) at first appeared to reduce somewhat the incidence of the rusts, presumably owing to the destruction of one or more of the young leaves, but later the seedlings so transplanted developed fully as much rust as those that were transplanted by hand. It was also found that the incidence and severity of the rusts increased in an almost geometrical ratio with the spacing allowed between the host plants, this fact obviously vitiating the objectives primarily aimed at in the work.

Levine (M. N.) & Cotter (R. U.). **Susceptibility and resistance of Berberis and related genera to Puccinia graminis.**—*U.S. Dept. of Agric. Tech. Bull.* 300, 26 pp., 8 figs., 1932.

Some definite knowledge concerning the reaction to stem rust (*Puccinia graminis*) of rather more than 100 established species, varieties, and hybrids of *Berberis* (the synonymy of which is clearly indicated) [*R.A.M.*, xi, p. 352] has been acquired from three sources, viz., (1) the results of artificial inoculations in the greenhouse; (2) observations of natural infections in the field and examination of herbarium material; and (3) studies of the published reports of other workers. The full data are carefully tabulated. The inoculations were made with sporidia of all the stem rust races known in North America, and infection was secured with all except that of timothy (var. *phlei-pratensis*) [ibid., xi, p. 437]. Some 90 per cent. of the species and varieties recognized in this investigation were found to be more or less susceptible to one or several of the strains of *P. graminis*, and only about twelve were immune, including *B. thunbergii* and its variety *atro-purpurea*, *B. repens*, *B. ottawensis* (*B. vulgaris* × *B. thunbergii*), *B. potaninii*, *B. beaniana*, and *B. concinna*. Some of these may prove, on further testing, to be susceptible, but there seems to be little doubt that *B. thunbergii* and *B. repens* are genuinely immune.

Forward (Dorothy F.). **The influence of altered host metabolism upon modification of the infection type with Puccinia graminis tritici p.f. 21.**—*Phytopath.*, xxii, 6, pp. 493–555, 11 figs., 1932.

The exposure of seedlings of eleven standard differential wheat varieties [which are named] to darkness for periods of one to

seven days in some 80 greenhouse tests at Toronto University resulted in changes in the appearance of the leaf tissues; in the type of infection produced by *Puccinia graminis tritici* physiologic form 21 [*R.A.M.*, xi, p. 436]; in the rate of development of the rust; and in some cases, especially with resistant hosts such as Khapli, Vernal, and Einkorn, in the number of pustules and visible infection centres.

Rust development was retarded by darkness, generally for a period exceeding that during which the seedlings were kept in the dark chamber. Seedlings subjected to protracted periods of darkness showed greater resistance, marked by a reduction in size or elimination of the pustules, as well as the appearance of sharply defined flecks of hypersensitive tissue [ibid., iv, p. 153] on ordinarily congenial hosts, such as Little Club, Arnautka, and Kota. The hypersensitive flecks failed to develop when exposure to darkness was interrupted by short (four-hour) daily periods of light, and also when the leaves were detached from the plants. Evidence was obtained of a correlation between the period of darkness required for the disturbance of compatibility between host and fungus of which flecking is the external symptom and the requisite duration of obscurity to kill the host tissues, the common factor in the causation of the two processes being probably of a metabolic order. On the return to the light of seedlings in which the tissues were not irreversibly affected by exposure to darkness, secondary pustules of a susceptible type appeared in the tissue adjacent to resistant primary infections resulting from darkening.

WATERHOUSE (W. L.). **On the production in Australia of two new physiologic forms of leaf rust of Wheat, Puccinia triticina Erikss.**—*Proc. Linn. Soc. New South Wales*, lvii, 1–2, pp. 92–94, 1932.

In November, 1930, dry wheat leaves heavily infected with the teleutospore stage of leaf rust (*Puccinia triticina*) were collected at Hawkesbury Agricultural College from a plot known to contain the physiologic forms Australian 1 and Australian 2 [*R.A.M.*, x, p. 367]. These leaves were kept in the laboratory throughout the summer and sent to Bathurst in the autumn to be exposed to winter temperatures. In September, 1931, abundant teleutospore germinations were observed. This is the first success in germinating these spores in a series of attempts covering a period of ten years, and is attributed to the protection afforded the teleutospores from the high summer field temperature, a method suggested by C. O. Johnston. Fragments of the wheat leaves bearing teleutosori were soaked in water for an hour and then placed on moistened young growths of *Thalictrum flavum* and *T. dipterocarpon*. After 24 hours both species showed abundant infections, from which eventually aecidiospores were taken to inoculate Federation wheat. Normal uredosori were produced and yielded uredospores which were tested on 12 differential wheat varieties. In addition to Australian 1 and Australian 2, two new physiologic forms (A and B) were distinguished by their effects on the Thew and Norka varieties.

SPANGENBERG (J.). **Observaciones sobre la modalidad e intensidad de ataque de la Puccinia glumarum en los cultivos Trigueros del país.** [Observations on the mode and intensity of infection by *Puccinia glumarum* in the Wheat stands of the country.]—*Min. Indus. Direcc. Agron. Publ. Mens.*, Montevideo, iv, 8, pp. 147–152, 1 col. pl., 2 figs., 1932.

A full account is given of the environmental conditions influencing the development and severity of the recently observed yellow rust (*Puccinia glumarum*) on wheat in Uruguay, with observations on the life-history of the parasite. A comparative table is given showing the distinguishing features of *P. glumarum* and the other wheat rusts occurring in Uruguay, viz., *P. graminis* and *P. triticina* [*R.A.M.*, xi, p. 359], and notes are given on the varietal reaction to the two last-named rusts of Uruguay wheats. *P. glumarum* was generally prevalent last season and none of the wheats grown appeared to be resistant to it.

MILAN (A.). **Le infezioni con 'Tilletia' ottenute per trauma e il grado di recettività dei tipi di Grano.** [Infections with *Tilletia* obtained by wounding, and the degree of susceptibility of Wheat types.]—*Nuovo Giorn. Bot. Ital.*, N.S., xxxix, 1, pp. 90–108, 2 graphs, 1932.

To ascertain whether infection following mechanical injury produces the same effect on wheat plants as results from sowing infected seed, the author carried out a series of experiments in continuation of his earlier researches [*R.A.M.*, viii, p. 228 ; x, p. 716], wheat seedlings of different varieties being wounded (by a needle prick at the base of the culms or by being broken off near the roots) and exposed to infection by *Tilletia tritici* and *T. levis* [*T. caries* and *T. foetens*]. The results obtained [which are tabulated, expressed graphically, and discussed] may be summarized as follows.

In the first set (experiment A), inoculated through wounds on 10th December, 1929, Carlotta Strampelli wheat subsequently had 91·7 per cent. of the plants and 74 per cent. of the ears bunted, the corresponding figures for Gentile rosso mutico, Mentana, Fausto Sestini, and Dauno wheats being, respectively, 90 and 70, 50·3 and 31·8, 10 and 2·5, 11·9 and 2·7 per cent.; spelt wheat showed only 2·5 and 0·4 per cent. plants and ears infected, respectively, and rye remained unaffected.

When the seedlings were exposed to infection without previous wounding (experiment B) practically no infections resulted, the few that did occur being attributed to accidental wounding.

When the first experiment was repeated on 19th and 20th December (experiment C) and the seedlings were planted so closely that they were unable to tiller so that theoretically the number of bunted plants should equal the number of bunted ears, the Carlotta Strampelli wheat showed 57·2 per cent. of the plants and 56·3 per cent. of the ears affected, the corresponding figures for Gentile rosso mutico, Mentana, Fausto Sestini, and Dauno wheats being, respectively, 51·5 and 51, 26·3 and 26·1, 8·7 and 8·3, and 9·1 and 8·6 per cent.; the spelt and rye remained unaffected.

In 1930–1 the tests were repeated on a larger scale, partly to ascertain the effect of carrying out the infections on different dates. Experiment A was repeated on 3rd and 4th December, with results that closely confirmed those obtained previously. On 22nd January experiment C was repeated, there being practically no tillering: the susceptible wheats showed less infection than in experiment C, while the resistant ones were about the same in both. This is attributed to the different dates and the different temperatures prevailing during growth renewal. A further test on 4th and 5th February, 1931, gave similar varietal results to those in December, though the percentages of affected ears were much lower, especially in the more susceptible varieties. When the experiment was repeated on 2nd April the susceptible varieties showed very slight infection (Carlotta Strampelli having only 8·7 per cent. bunted plants and 2·8 per cent. bunted ears), the moderately susceptible ones being those most affected, Mentana having 14·8 per cent. bunted plants and 9·5 per cent. bunted ears, and Ardito 12·9 and 5·6 per cent., respectively. In tests made on 12th and 23rd April with very robust seedlings, many of the plants died, the remainder maturing only a few ears; the only varieties to become infected were the early, moderately susceptible ones such as Mentana and Ardito.

In the author's opinion wound inoculations are, under certain conditions, the only reliable method of judging the relative reaction of varieties to infection by bunt. Whether wounding or sowing infected seed is resorted to, the only condition which gives truly comparable results is to prevent the plants from tillering, so that, theoretically, each plant corresponds to one ear. When, however, it is desired to estimate the damage from bunt that any given variety would probably sustain under field conditions, then this must be estimated from the number of affected ears.

MILAN (A.). **L'alterazione della forma sulle spiche di Grano colpite dalla carie.** [Alteration in the shape of bunted Wheat ears.]—*Nuovo Giorn. Bot. Ital.*, N.S., xxxviii, pp. 585–588, 1931. [Abs. in *Riv. Pat. Veg.*, xxii, 3–4, pp. 103–104, 1932.]

Wheat ears infected by *Tilletia tritici* and *T. levis* [*T. caries* and *T. foetens*] when compared with healthy ones growing under identical conditions show a greater space between the points of insertion of the spikelets on the rachis, so that they appear to be longer and looser than normal. Furthermore, when wheats with clavate ears become infected they lose their characteristic apical expansion. These changes vary in degree with the severity of infection and may cause the ear of any given variety to appear to belong to a different variety.

RUSSELL (T. A.). **Observations on foot-rot diseases of cereals.**—*Trans. Brit. Mycol. Soc.*, xvi, 4, pp. 253–269, 1 pl., 1932.

The author states that a survey in 1929 and 1930 of cereal crops in the Cambridge district showed that seedling blights and ear blights due to fungal attack were comparatively rare; on the other hand, foot rot diseases as manifested by the symptoms of white-

heads and thinning-out were found to be present in almost every field examined, and sometimes attained serious proportions. Of the fungi isolated from affected plants *Fusarium culmorum* [*R.A.M.*, vii, p. 710; x, p. 784; xi, p. 444] proved to be by far the most common on all cereals. Two strains of *Helminthosporium sativum* were isolated from the base of stems of wheat, this being, so far as the author is aware, the first record of this species associated with root rot of wheat in England; a third strain was isolated from a barley seedling. Pathogenicity tests [details of which are given] showed *F. culmorum* and *H. sativum* to be highly pathogenic to wheat in the seedling stage, and later to produce the whitehead symptom. In the greenhouse *F. culmorum* attacked wheat, barley, and oats with equal severity, while *H. sativum* was more injurious to wheat than to barley and hardly affected oats [ibid., xi, p. 503]. Both fungi gained entry into wheat seedlings through the root and shoot tissues, their germ-tubes penetrating by boring through the cuticle.

The investigation suggested that this class of diseases may be controlled by a sound system of farming, including good tillage and balanced manuring.

VILKAITIS (V.). **Fusarium culmorum (W.G.Sm.) Sacc. žiemkenčiu grūduose.** [*Fusarium culmorum* (W.G.Sm.) Sacc. on winter-sown cereals.]—Reprinted from *Ž. Ū. Metraščio* [*Yearbook Acad. of Agric.*] *1930–31*, Kaunas [Kovno], 6 pp., 4 figs., 1932. [German summary.]

Investigation of the considerable damage that was done in 1931 to winter-sown wheat and rye in Lithuania by the so-called winter injury [*Fusarium* spp.] indicated that the trouble was in a very great measure attributable to the activity of *F. culmorum* [see preceding abstract]. This fungus was repeatedly isolated by the author from wheat and rye ears, and its pathogenicity to these hosts was definitely established in artificial infection experiments, which resulted in the typical reproduction of the disease.

DASTUR (J. F.). **Foot-rot and 'black point' diseases of Wheat in the Central Provinces.**—*Agric. & Live-Stock in India*, ii, 3, pp. 275–282, 3 pl., 1932.

Considerable damage is caused each year to the Nagpur (Central Provinces) wheat crop by foot rot and 'black point' (*Helminthosporium* spp.) [*R.A.M.*, vii, p. 493; x, p. 758]. The basal and underground portions of the plant show brown or creosote-coloured, later black, lesions; sometimes the rootlets are thin and fuzzy. Diseased plants are usually dwarfed and produce few or no heads. Some or all the glumes enclosing the grains bear elliptical, brown to black, dark-edged lesions; in advanced cases the grains may be light and shrivelled or partially blackened. Both seedlings and mature plants may be attacked, infection occurring either directly from the seed or through the soil. Seeds that are half or entirely blackened usually fail to germinate, though they may do so if the embryo is not penetrated by the mycelium. As a rule the blackening consists of a mere dot, sometimes barely visible, near the embryo. The infection of germinat-

ing seedlings, arising either from diseased or healthy seeds, is evident from the presence of lesions on the coleorhiza and the plumule. The pale to dark brown lesions on the plumule extend elliptically, sometimes reaching and killing the shoot. On the coleorhiza the spots spread irregularly and may destroy the primary and lateral roots, while the rhizome may also be infected from this source, or from the soil. The adventitious roots arising from the succeeding nodes of the plumule are generally liable to infection from the diseased coleoptile and remnants of the lower leaf sheaths. The foot-rotting fungi have been known to remain viable in 'black point' seed and diseased parts of wheat plants for at least three years.

The results [which are tabulated] of field experiments on the development of foot rot and black point in relation to the date of sowing indicate that late sowing (middle to end of October and early November) reduces the incidence in infection. High atmospheric humidity when the grain is in ear has been observed to favour the development of black point, to which the Bansi and Pusa 100 varieties are particularly susceptible, the former being specially liable to attack by *H. sativum*.

KLING. **Starkes Auftreten von Staubbrand in der Wintergerste.** [An extensive outbreak of loose smut in winter Barley.]—*Deutsche Landw. Presse*, lix, 25, p. 316, 1932.

Winter barley in the Cassel district of Germany has been attacked to an unprecedented extent by loose smut [*Ustilago nuda*: *R.A.M.*, x, p. 782], the incidence of infection by which ranged from 30 to 90 per cent., and a heavy reduction of the total yield was anticipated at the time of writing. Over an area of about 1 sq. m. 180 out of 400 plants were smutted, and it was found that such fields had been sown with seed-grain several years old. Stands from original and first year's seed, on the other hand, were virtually free from loose smut. Since the hot-water treatment is beyond the capacity of the average farmer, the control of loose smut can only be effected by the use of fresh seed from certified healthy stands.

SCHNEIDER. **Nochmals: Staubbrand in der Wintergerste.** [A further note on loose smut in winter Barley.]—*Deutsche Landw. Presse*, lix, 27, p. 341, 1932.

Loose smut [*Ustilago nuda*] of winter barley has been very severe during the current season in the Höchst district, Frankfurt-am-Main, especially on the Streng variety [see preceding abstract]. Original stands were equally affected with those from seed-grain several years old.

TAPKE (V. F.). **Seed treatments with chemical dusts and formaldehyde for smut control in Oats.**—*Phytopath.*, xxii, 5, pp. 429–441, 1932.

Full details are given of a series of disinfection experiments against the loose and covered smuts of oats (*Ustilago avenae* and *U. levis* [*U. kolleri*]) conducted in Virginia and Idaho in 1928 and 1930 and in the former State in 1931. Twenty-one chemical dusts

were used at the rate of about 3 oz. per bushel in comparison with the formaldehyde dip (ten minutes at a strength of 1 in 320).

The latter gave the best results in 1930 and 1931, completely eliminating infection (which was relatively high in the untreated controls in every seed lot). In both years the Du Bay dusts 655 and 665 (the active ingredient of which is ethyl mercury phosphate) [cf. *R.A.M.*, xi, pp. 454, 491] gave almost absolute control. Smuttox [ibid., x, p. 449], kantsmut, and corona oat dust [ibid., vi, p. 399], containing 4, 4, and 5 per cent. formaldehyde, respectively, came next in efficacy, reducing the incidence of infection to 1 per cent. or less (mostly nil) in all the seed lots. Ceresan was also highly toxic to the smuts in every test except one, when 2·8 per cent. infection occurred in the seed lot treated with this preparation compared with 24·2 per cent. in the control. K–1–C, tested in 1928, gave fairly satisfactory results while K–1–D was not so effective; both these dusts are similar in composition to ceresan but contain less of the toxic principle (ethyl mercury chloride). Ansbacher grain dust and wa-wa dust [ibid., vii, pp. 363, 572] gave good results in Virginia and in the second but not in the first Idaho sowing in 1930. No appreciable reduction of germination was caused by any of the treatments except the formaldehyde dip, which produced a decline in 1931 from 93·3 to 88·8 per cent.

Weston (W. H.) & Uppal (B. N.). **The basis for Sclerospora sorghi as a species.**—*Phytopath.*, xxii, 6, pp. 573–586, 1 pl., 1 fig., 1932.

Comparative investigations have been carried out on Kulkarni's *Sclerospora graminicola* var. *andropogonis* on sorghum from Poona, India, on *S. graminicola* from *Pennisetum typhoideum* collected in the same locality, and on *Setaria* in the United States [*R.A.M.*, x, p. 517]. In the former the conidiophores bear a branch system of usually three primary branches of approximately equal size, spreading out from the main axis in close succession so that the conidia borne on the tips of the branchlets lie in a hemispherical plane, whereas in the type species short branches grow out at irregular intervals and the conidia lie in irregularly disposed bunches. The sterigmata tend to be somewhat longer in the sorghum fungus, a further distinguishing feature of which is the presence of a transverse septum about half-way between the conidiophore base and the beginning of the branch system. In the sorghum *Sclerospora* the conidia are generally broadly rotund and the ends equally bluntly rounded, with the greatest diameter at the middle, while in *S. graminicola* a point somewhat above the middle shows the greatest breadth, the apex being bluntly rounded and the base somewhat tapering. The most important difference between the two fungi, however, is that, while in the fungus on sorghum the conidial wall continues unaltered across the apex, in *S. graminicola* it is thickened at maturity into an apical papilla. Moreover, the conidia of *S. graminicola* germinate by zoospores, whereas in the sorghum fungus germination is by one or two germ-tubes. The oospore stages are very similar in both organisms.

A further difference between the two fungi was shown by cross-

inoculation experiments [the results of which are tabulated] with oospore material germinated by Hiura's method [ibid., ix, p. 774]. The sorghum fungus failed to infect *Setaria italica* and *P. typhoideum*, while *S. graminicola* from these hosts cannot attack sorghum. Both the sorghum fungus and *S. graminicola* from *Setaria* gave positive results on teosinte (*Euchlaena mexicana*). On the basis of these morphological and physiological distinctions the sorghum fungus is raised from varietal to specific rank as *S. sorghi* (Kulk.) Weston & Uppal with an emended diagnosis in English.

Uppal (B. N.) & Desai (M. K.). **Two new hosts of the downy mildew of Sorghum in Bombay.**—*Phytopath.*, xxii, 6, pp. 587–594, 1 fig., 1932.

In 1929 maize plants of local, Philippine, and Golden Bantam varieties at Poona were severely attacked by a downy mildew, the symptoms of which closely resembled those caused on sorghum by *Sclerospora graminicola* var. *andropogonis-sorghi* [*S. sorghi*: see preceding abstract], except that the former host did not show the characteristic shredding of the leaves. Inoculation experiments under controlled conditions with the sorghum *Sclerospora* gave positive results on maize and teosinte (*Euchlaena mexicana*). A comparative morphological study [details of which are given] of the conidial phase of the mildew as it occurs naturally on maize and sorghum revealed no significant or constant differences between the organisms on the two hosts, and it is therefore concluded that *S. sorghi* is responsible for the disease in both cases.

Maklakova (Galina F.). Некоторые данные о развитии черни на Мандариновых насаждениях в Батумском округе. [A few data concerning the development of sooty moulds on Tangerine trees in the district of Batum.]—*Bull. Plant Protection*, Leningrad, v, 1, pp. 97–110, 1 pl., 1932. [English summary.]

In noticing the wide distribution and severity of sooty mould on various plants and trees on the Caucasian littoral of the Black Sea, the author gives a detailed account of her experiments to determine the factors that favour its spread and development on tangerine [*Citrus nobilis* var. *deliciosa*] trees, which are particularly severely affected by it in that region. The results indicated that scale insects, especially *Lecanium hesperidum*, play an important part in the development and spread of the moulds; the latter grow most profusely around and on the fixed insects which are finally destroyed by one or more of the fungi, an undetermined species of *Cladosporium* being particularly active in this respect. There was some evidence that a species of *Ceroplastes* may also be involved. The main spread of the moulds is, however, ensured by rain and wind. The fungi developed as well in diffused as in direct light, and the main factor determining a luxuriant growth of the organisms was found to be moisture.

Microscopical determinations showed that among the fungi responsible for sooty mould the undetermined species of *Cladosporium* was numerically the most important, the other organisms

most frequently encountered being *Capnodium citri* [*R.A.M.*, x, p. 492], and species of *Macrosporium*, *Alternaria*, and *Helminthosporium*.

A series of tests showed that the germination of the *Cladosporium* was totally inhibited by a 0·1 per cent. copper sulphate solution, even in the presence of 5 per cent. sugar; the addition of 15 to 20 per cent. sugar to the copper sulphate solution appeared, however, to preserve a few of the spores from destruction, their germination being only delayed.

COOKE (F. C.). **Investigations on Coconuts and Coconut products.**—*Dept. of Agric. Straits Settlements and Fed. Malay States Bull.* 8, Gen. Ser., 99 pp., 9 pl., 3 figs., 1932.

The following items of phytopathological interest occur in the section of this bulletin dealing with various aspects of copra deterioration (pp. 67–71). The moulds chiefly responsible for damage to stored copra in Malaya are *Aspergillus niger*, *A. flavus-oryzae*, and *A. tamarii*, penetrating wet material, and *A. glaucus* and *A. cinnamonensis*, occurring superficially on dry copra [cf. *R.A.M.*, xi, p. 175]. The presence of excess moisture (over 8 per cent.) is evidently the determining factor in the initiation of copra deterioration, but it is not the sole one, since the moulds do not generally appear until after the development of a bacterial slime, a process occupying about two days from the time the nuts are split and exposed to the air. Possibly the sequence of invasion by bacteria and moulds is determined by the appearance of certain degradation products of the complex glycerides, proteins, and carbohydrates present in coco-nut 'meat'.

ULTÉE (A. J.). **Verslag over de werkzaamheden van het Proefstation Malang in het jaar 1931.** [Report on the work of the Malang Experiment Station in the year 1931.]—*Meded. Proefstat. Malang*, 82, 55 pp., 1932.

The following item of phytopathological interest occurs on p. 15 of this report. The fact that coffee plants (both Robusta and Excelsa) raised from the seed of trees suffering severely from top die-back remained healthy has confirmed the supposition that the disease does not spread in this manner [*R.A.M.*, x, p. 518].

MAYNE (W. W.). **Recent work on Coffee leaf disease.**—*Planters' Chron.*, xxvii, 10, pp. 253–257, 1932.

The coffee selection (S. 5/30) that first revealed the existence of two physiologic forms of leaf disease (*Hemileia vastatrix*) in South India [*R.A.M.*, xi, p. 511] is stated to belong to a collection grown from seed which came from the Wager estate in North Mysore under the title of 'Parent of Kent' [a name which Mr. L. P. Kent subsequently, on p. 400 of the same journal, states to be an error]. Tests made on one or two of the Kent plants showed that their reaction to the forms of leaf disease is identical with that of S. 5/30, and assuming that a considerable proportion of the plants of this variety possess the character of resistance, their success as fillers for the susceptible Coorg variety is readily explicable. As the form on the Kent variety, however, develops and sporulates as rapidly as that infecting the Coorgs, there is no reason why it

should not attack the former variety when grown in large blocks with equal severity, and such a phenomenon has, indeed, actually been observed in clearings of Kents in districts where *H. vastatrix* is prevalent. The importance of these observations to the general problem of the improvement of South Indian coffee strains is briefly indicated. In describing the technique of his experiments the author states that the main factor necessary for successful infection is the exclusion of light during the period immediately after inoculation.

STAHEL (G.). **Zur Kenntnis der Siebröhrenkrankheit (Phloëmnekrose) des Kaffeebaumes in Surinam. II.** [Contribution to the knowledge of the sieve-tube disease (phloem necrosis) of the Coffee tree in Surinam. II.]—*Phytopath. Zeitschr.*, iv, 5, pp. 539–544, 4 figs., 1 map, 1932.

Continuing his investigations on phloem necrosis of Liberian coffee in Surinam [*R.A.M.*, xi, p. 236], the writer examined, in December, 1931, the roots (preserved in alcohol) of three bushes showing similar symptoms in the West Bank district of British Guiana. Phloem necrosis in a very acute form was detected in all three cases, indicating that the sudden collapse of apparently healthy bushes in the latter country is due to the same cause as the chronic disease of coffee in Surinam. At the same time a report was received from Brazil of the so-called 'red' disease of Arabica coffee, the external symptoms of which correspond closely with those of phloem necrosis (S. Hardman, Relatorio do anno de 1927. Sec. Agric., Comm., Indus., etc., 1928).

According to this report a disease of coffee bushes was first observed in 1917 in Pernambuco and Parahyba, but it was not until 1921 that extensive wilting and dying-off began to take place. Prof. B. Pickel, of the Tapera Agricultural College, found that a coccid, *Rhizoecus coffeae*, living in symbiosis with an ant, *Acropyga pickeli*, is constantly present in large numbers on the roots of diseased trees and appears to be concerned in the transmission of infection. The sporadic occurrence of the latter in healthy, vigorous plantings is attributed to the fact that the winged ants each carry a coccid with them on their flights. The same observation was made independently by H. Bünzli. Hardman and Pickel found that older trees are more liable to the 'red' disease than young ones. At the writer's request fragments of the cortex of diseased coffee roots were sent to him from Brazil, and were found on examination to show the multiple division and necrosis of the sieve-tubes characteristic of phloem necrosis in Surinam, though in Arabica coffee these features are less conspicuous than in the Liberian. On staining this material with Giemsa's fluid fusiform structures of the *Phytomonas* type were detected, but since the presence of flagella (though indicated) could not be clearly established the exact identity of these bodies remains uncertain pending further studies. The coccids were observed to have pushed their stylets through the cortex to the phloem. As soon as a diseased root is entirely depleted of starch, a new healthy one is sought, and it is highly probable that flagellates are thus transferred to the phloem of sound roots.

HOPKINS (J. C. F.). **Some diseases of Cotton in Southern Rhodesia.**—*Empire Cotton Growing Review*, ix, 2, pp. 109–118, 1932.

The results of five years' field observations and laboratory experiments on cotton diseases in Southern Rhodesia are summarized. Seed disinfection against *Bacterium malvacearum*, which occurs in the angular leaf spot form, is recommended and may require to be supplemented by more attention to rotation as the six to seven months of dry weather in Rhodesia gives little chance for the rapid disintegration of infected leaves and bolls [cf. *R.A.M.*, x, p. 661].

Internal boll disease has so far only been found associated with *Nematospora coryli* [ibid., x, p. 519], which appears from field observations to be conveyed in Southern Rhodesia, as in other regions, by *Dysdercus* spp. These insects appear in the cotton fields about the end of February or beginning of March, i.e., at the beginning of the dry season when conditions are relatively unfavourable for the fungus. Boll rots of minor importance are caused by *Rhizopus nigricans* [ibid., x, p. 586]; *Epicoccum purpurascens*, a virulent wound parasite, producing a bright yellow, later yellowish-brown discoloration of the internal tissues of the boll wall; and an apparently new bacterium closely resembling *Bact. mori* [ibid., x, p. 347], which is responsible for a soft, brown internal rot of the lint and seed and a brown discoloration of the placenta, to which it gains entrance through the sutures. The strain of *E. purpurascens* appears to be identical, according to an unpublished communication, with that isolated by Miss Bottomley from citrus in South Africa.

Notes are also given on the leaf spot and boll rot due to *Alternaria gossypina* [ibid., xi, p. 371], the leaf spots due to *A. macrospora* [ibid., x, p. 586] and *Phyllosticta gossypina* [ibid., x, p. 435]; sore shin (*Rhizoctonia* [*Corticium*] *solani*) [ibid., xi, p. 454]; discolorations of the lint caused by members of the *A. tenuis* group, a species of *Acremoniella* apparently identical with one observed by the writer in Uganda, and other fungi; a stem disease associated with *Pestalozzina* sp., believed to be the first record of this genus on cotton; and anthracnose (*Glomerella gossypii*) [ibid., iv, p. 217].

YOUNG (W. H.), JANSSEN (G.), & WARE (J. O.). **Cotton wilt studies. IV. Effect of fertilizers on Cotton wilt.**—*Arkansas Agric. Exper. Stat. Bull.* 272, 26 pp., 4 figs., 1 map, 1932.

High potash applications (muriate of potash 300 lb. or kainit 1,080 lb. per acre) or fairly high potash applications in combination with nitrogenous and phosphoric salts (nitrate of soda 150 lb., superphosphate 312 lb., and muriate of potash 40 lb. per acre) gave good control of cotton wilt [*Fusarium vasinfectum*] on the susceptible Trice and Misdel varieties in Arkansas in experiments from 1929 to 1931 [*R.A.M.*, xi, p. 453]. High nitrate applications, nitrogen and phosphorus only, and cottonseed meal alone were ineffective for this purpose. In nearly every case the control of wilt seemed to be correlated with that of 'rust' or potash hunger, and

coupled with increased yields. It is probable, therefore, that on the sandy alluvial soils where 'rust' and wilt are often found together in a severe form, the combination of a suitable wilt-resistant variety with the judicious use of a potash-containing fertilizer will be the best to use.

Dana (B. F.), Rea (H. E.), & Dunlavy (H.). **The influence of date of planting Cotton on the development of root-rot.**—*Journ. Amer. Soc. Agric.*, xxiv, 5, pp. 367–377, 3 diags., 1932.

An extensive range of cotton plantings was made at Temple, Texas, from 1928 to 1930, inclusive, to determine the influence of the date of planting on the incidence of root rot (*Phymatotrichum omnivorum*) [*R.A.M.*, xi, p. 573] in Houston black and clay soils, which are very favourable to the disease. In 1928 the plantings were made on 1st and 15th April, 1st and 15th May, and 1st and 15th June; in 1929 on 22nd April and 4th and 20th May; and in 1930 on 10th April and 1st and 29th May. Several out-of-season plantings were also made, viz., on 15th March and 1st and 15th June in 1928 and on 12th June in 1929. The Delfos, Kasch, and Bennett varieties (early, medium, and late, respectively), were used for each date in each year. In 1928 and 1929 Westex (early), Acala (medium), Sunshine (medium), and Mebane (late) were also used.

The first appearance of the disease was found to be influenced by the age of the crop. In no instance did less than 30 days elapse between the planting and the first sign of infection. For the planting of 15th June, 1928, the initial infections were later on the average than in that of 1st June, while at the latter date the appearance of the disease was delayed as compared with 15th May. In 1929 infection occurred later on the planting of 20th May than on that of 4th May, and still later on that made on 13th June. Again, the plantings made on 1st and 20th May, 1930, showed a greater delay in the appearance of the disease than those of 10th April. The absence of any relation between the age of the plants and the amount of root rot infection in the earlier sowings suggests that some other factor, probably temperature, is of primary importance at this time. After root rot was established, however, and temperatures had become favourable to infection, the age of the plant exerted a decisive influence. In Delfos, for instance, the infection counts on 11th August, 1928, showed losses of 16·1, 23·5, 17·6, 11·0, 8·0, 3·6, and 1·4 per cent., respectively, in early to late plantings from 15th March to 15th June. In 1929 (counted on 12th August) the percentages were 21·3, 17·0, 7·1, and 6·4 from 22nd April to 13th June, and again in 1930 (11th August), the plantings made from 10th April to 20th May showed a rapid decline in loss percentages in the order of 23·8, 13·6, and 7·0, respectively.

Taubenhaus (J. J.) & Ezekiel (W. N.). **Resistance of monocotyledons to Phymatotrichum root rot.**—*Phytopath.*, xxii, 5, pp. 443–452, 1 fig., 1932.

Laboratory and field inoculation experiments [details of which

are given] in Texas on a large number of monocotyledonous plants with the causal organism of cotton root rot (*Phymatotrichum omnivorum*) [see preceding abstract] gave entirely negative results, whereas control inoculations on cotton, carrot, and okra [*Hibiscus esculentus*] caused the development of typical symptoms in every case. Evidently, therefore, the monocotyledons tested are neither hosts nor carriers of the fungus.

BACH (W. T.) & TAUBENHAUS (J. J.). **Resistance of the Turk's-Cap Hibiscus, Malvaviscus conzattii, to Phymatotrichum root rot.**—*Phytopath.*, xxii, 5, pp. 453–458, 1 fig., 1932.

The Turk's-cap *Hibiscus* (*Malvaviscus conzattii*) appears to constitute an exception to the rule that plants belonging to the Malvaceae are highly susceptible to cotton root rot (*Phymatotrichum omnivorum*) [see preceding abstract]. Among 82 species of this family, *M. conzattii* was the only one showing no infection under field conditions in Texas, while 1,066 inoculation tests on well-established plants also gave negative results.

EZEKIEL (W. N.), TAUBENHAUS (J. J.), & FUDGE (J. F.). **Growth of Phymatotrichum omnivorum in plant juices as correlated with resistance of plants to root rot.**—*Phytopath.*, xxii, 5, pp. 459–474, 1932.

Phymatotrichum omnivorum, the causal organism of cotton root rot [see preceding abstracts], was grown in the juices expressed from four monocotyledonous plants, viz., maize, onion, *Canna*, and nut grass (*Cyperus rotundus*), resistant to the disease and from four dicotyledonous plants (cotton, carrot, turnip, and sweet potato) susceptible to it. The oven-dry weight of the resulting mycelium was determined.

The growth of the fungus was markedly inhibited in the undiluted but autoclaved juices of all the resistant plants, whereas profuse development occurred in the juices of all the susceptible ones except turnip.

PETCH (T.). **Notes on entomogenous fungi.**—*Trans. Brit. Mycol. Soc.*, xvi, 4, pp. 209–245, 8 figs., 1932.

Continuing his notes on entomogenous fungi [*R.A.M.*, xi, p. 179], the author describes and discusses 27 species of *Cordyceps* and other genera, mostly from tropical and sub-tropical regions. Referring to his previous note on *Empusa lecanii* [ibid., vi, p. 228], he states that he received from Ocfemia specimens of *Aphis sacchari* from the Philippine Islands in a condition similar to that described by him on *Lecanium viride*; the dead insects are covered with *Cladosporium*, among which are fine hyphae bearing vesicles resembling the sporangia of a *Pythium* as figured in the previous communication [loc. cit.]; a comparison with the figures of Thaxter (*Entomophthoreae of the United States*) shows clearly that the supposed sporangia are secondary conidia of a species of *Empusa* which, from the details available, should apparently be referred to *E. fresenii* [ibid., x, p. 226]. According to Ocfemia the disease killed from 80 to 95 per cent. of the aphids in some experiments.

Specimens received from Florida showed that the fungus on

Aleyrodes citri and other citrus scale insects which was referred by Fawcett to *Verticillium heterocladum* [ibid., vi, p. 255] differs from Penzig's species in having solitary terminal conidia on the phialides and no warts or sterigmata, and also in having some of the whorls of phialides on short lateral branches; it is therefore considered to be a separate species, for which the name *V. cinnamomeum* nom. nov. is proposed, an English diagnosis being given.

A number of the species described are considered to be new to science.

WATERS (R.). **Mycotic dermatitis in sheep.**—*New Zealand Journ. of Sci. and Techn.*, xiii, 5, pp. 309–310, 1 fig., 1932.

Attention is drawn to the occurrence in merino sheep in South Island, New Zealand, of mycotic dermatitis due to *Actinomyces dermatonomus*, which has previously been reported from Australia and South Africa [*R.A.M.*, xi, p. 457].

BARDELLI (P.) & CILLI (V.). **Osteomielite tibiale primitiva di origine centrale da 'Cryptococcus farcinimosus Rivoltae'.** [Primary tibial osteomyelitis of central origin due to *Cryptococcus farcinimosus* Rivolta.]—*Clinica Veter.*, 1, 1931. [Abs. in *Bull. Inst. Pasteur*, xxx, 8, p. 385, 1932.]

Two cases of tibial osteomyelitis in equines (a rare condition), due to *Cryptococcus farcinimosus* [? in Italy: *R.A.M.*, x, p. 791], are described, showing the possibility of haematogenous diffusion of the organism.

SCARAMELLA (PIERA). **Su un infezione fungina di uova conservate in frigorifero prodotta dal 'Verticillium monosporioides' Peyr.** [On a fungal infection of eggs in cold storage produced by *Verticillium monosporioides* Peyr.]—Reprinted from *Giorn. Biol. Appl. alla Indus. Chim.*, i, 4, 12 pp., 1 fig., 1931.

A large proportion of a consignment of eggs kept in cold storage in Italy in 1930 developed a serious fungal infection apparently induced by the humid conditions which caused drops of water to condense on the shells. The albumen of badly affected eggs contained clots consisting of the hyphae of *Verticillium monosporioides* Peyronel. The fungus was found to be capable of growing and fructifying at a temperature of 0·5° to −0·5° C.; in hanging drop cultures the spores germinated in 24 hours at 20°. The disease was reproduced artificially in an atmosphere maintained at 0° C. and 98° humidity, the spores germinating and penetrating the eggs in four days.

GRAHAM (G. S.). **Rhinosporidium seeberi in nasal polyp. The fourth North American case.**—*Amer. Journ. Clin. Path.*, ii, 2, pp. 73–85, 8 figs., 1932.

Full clinical details are given of a case of nasal polypus due to *Rhinosporidium seeberi* [*R.A.M.*, xi, p. 515] in a negro boy in Alabama. The source of infection is unknown, no similar condition having been observed in the community for at least ten

years. In fact, the discontinuity of infection is a remarkable feature of rhinosporidiosis, of which over forty cases reported during the last thirty years have been observed in three widely separated countries, namely, India, Argentina, and the United States.

SARTORY (A.), SARTORY (R.), WEILL (J.), & MEYER (J.). **Un cas de blastomycose invétérée transmissible au cobaye, due à un Saccharomyces pathogène (Saccharomyces jadini n. sp.).** [A case of deep-seated blastomycosis transmissible to the guinea-pig, due to a pathogenic *Saccharomyces* (*Saccharomyces jadini* n. sp.).]—*Comptes rendus Acad. des Sciences*, cxciv, 19, pp. 1688–1700, 1932.

From an abscess in the sacral region of a young woman the writers isolated in 1931 a species of *Saccharomyces* characterized by budding oval cells, 4 to 5 by 2 to 3 μ in diameter, and numerous asci measuring 5 by 3·75 μ, which contained two or four ascospores each 1·25 μ in diameter. On solid media hyphal elements up to 25 to 30 by 1·25 to 2·5 μ were formed. The fungus, to which the name *S. jadini* n. sp. is given, coagulates milk but does not liquefy gelatine or utilize albumin; glucose and maltose are actively fermented. It was inoculated into guinea-pigs with fatal results after five to seven months and reisolated from the liver and spleen.

REDAELLI (P.). **Il problema delle Torulopsidaceae e dei loro rapporti con l'uomo e con la patologia umana studiato particolarmente in Italia (Blastomiceti e blastomicosi).** [The problem of the Torulopsidaceae and their relations to man and to human pathology studied particularly in Italy (Blastomycetes and blastomycoses).]—Reprinted from *Riv. di Biol.*, xiii, 67 pp., 3 figs., 1931.

In this paper, which describes in detail a long series of investigations into the Torulopsidaceae (Blastomycetes) with reference to their relation with human pathology under the climatic conditions prevailing in temperate climates, and especially in Italy, the author, after fully discussing the systematic position of these fungi [*R.A.M.*, viii, p. 677], deals with their life in the atmosphere surrounding man (infection generally arising from contact, food, and drink), their possible relations with the various parts of the body ('commensalism'), their mode of infection and spread in the different organs, their ability to act as parasites, the natural susceptibility to them possessed by man, and the forms of disease they set up considered from an anatomical and clinical point of view. The genera known to contain human parasites are *Torulopsis* and *Pityrosporum* (corresponding to the old genus *Cryptococcus*), *Blastodendrion*, *Geotrichum*, *Candida*, *Mycotorula*, and *Enantiothamnus*. The paper concludes with a consideration of some diagnostic problems of blastomycoses in general and questions of experimental pathology.

A list is given of works containing important bibliographies of the subject.

Niño (F. L.). **Consideraciones diagnosticas acerca de la propagación al aparato respiratorio de la blastomicosis de Gilchrist.** [Diagnostic considerations on the propagation in the respiratory system of Gilchrist's blastomycosis.]—*6ª Reunion Soc. Argentina Patol. Region. Norte, Salta, 1930*, pp. 168–179, 1931. [Abs. in *Bull. Inst. Pasteur*, xxx, 8, pp. 388–399, 1932.]

Clinical observations are made on a fatal case of blastomycosis of the Gilchrist-Stokes type [*Blastomyces dermatitidis*: *R.A.M.*, vii, p. 578; ix, p. 652; xi, p. 43]. Rounded, yeast-like elements with a thick membrane were detected in the pus of the buccal lesions and sputum as well as in sections from scrapings. Cultures were extremely difficult to obtain and always scanty; the best media were glucose agar and coagulated human serum. The brownish colonies were formed of rounded elements of varying dimensions, the largest surrounded by a thick membrane and filled with spherical bodies; more or less elongated hyphae, with intercalary and terminal swellings, also occurred. At the autopsy the lungs were found to be choked with miliary granulations enclosing giant cells teeming with the organism. Diffusion by way of the lung is stated to occur in 97 per cent. of the cases of Gilchrist's blastomycosis.

Basgal (W.). **Contribuição ao estudo das blastomycoses pulmonares.** [Contribution to the study of the pulmonary blastomycoses.]—*Thesis, Fac. Med. Rio de Janeiro*, 156 pp., 15 pl., 1931. [Abs. in *Bull. Inst. Pasteur*, xxx, 8, p. 382, 1932.]

After a general exposition of the pulmonary mycoses and their various agents, the writer gives a minutely detailed account, supplemented by radiographs, of five cases in which generalized buccal ulcerations due to *Coccidioides* were accompanied by pulmonary disorders; the presence of the fungus was demonstrated in the sputum of two patients. Da Fonseca's and Leão's determination of the Brazilian *Coccidioides* as distinct from the North American species [*C. immitis*: *R.A.M.*, vii, pp. 167, 719; ix, p. 652] is accepted.

Stewart (R. A.) & Meyer (K. F.). **Isolation of Coccidioides immitis (Stiles) from the soil.**—*Proc. Soc. Exper. Biol. and Med.*, xxix, 8, pp. 937–938, 1932.

Epidemiological studies on coccidioidal granuloma (*Coccidioides immitis*) [*R.A.M.*, xi, p. 515, and preceding abstract], recently summarized by Beck (*California Dept. of Public Health Special Bull.* 57, p. 19, 1931), suggest the soil and vegetation as the probable source of infection. In the course of detailed studies at the University of California it was found that the following medium gave selective cultures: 1 part each of ammonium chloride and sodium acetate, equal mixture of KH_2PO_4 and K_2HPO_4 0·4 part, magnesium sulphate 0·01 part, and distilled water 100 parts. *C. immitis* and certain species of *Blastomyces* and *Aspergillus* are stated to make extremely good growth in this solution, to which acriflavine (1 in 25,000) may be added for further purification from contaminants.

To obtain the fungus from large samples of soil or vegetation, such as the earth round the sleeping quarters at a ranch in Kern County, the sample of dirt is mixed with a small amount of brine and triturated into a thick paste which is percolated into a cylinder containing 30 per cent. salt solution. As the particulate matter passes through the column of brine the bacterial and fungus spores are liberated and rise to the surface. After three hours' exposure of the soil to the action of the brine the supernatant liquid is decanted, diluted one-half with sterile water, and centrifuged, the sediment being either cultured in the selective medium or inoculated subcutaneously into guinea-pigs.

Positive isolations from the soil of the ranch in question were anticipated on account of four cases of coccidioidal granuloma among the Filipino working crew and were obtained. The inoculated guinea-pigs developed either a generalized infection with miliary localization in the lungs, purulent epididymitis and lymphadenitis, or merely temporary abscesses at the site of injection. The pus contained the characteristic double-contoured capsules with endospores. Obviously the mould is highly virulent on isolation from the soil, where it is capable of surviving for months.

Niño (F. L.). **Blastomicosis humana generalizada por criptococo (n. sp.).** [Generalized human blastomycosis due to a new species of *Cryptococcus.*]—*6ª Reunion Soc. Argentina Patol. Region. Norte, Salta, 1930*, pp. 117–167, 3 pl., 1931. [Abs. in *Bull. Inst. Pasteur*, xxx, 8, p. 386, 1932.]

In this memoir and a preceding one of the same title by D. Speroni, L. Llambias, S. Parodi, and the author (5ª Reunion, 1929), a comprehensive account is given of a fatal case of generalized blastomycosis involving the skin, internal organs, and the brain (encephalitic meningitis). The fungus isolated from the affected organs and from the cephalo-rachidian liquid is described as a non-thermophilic yeast with colonies composed entirely of blastospores, and is named *Cryptococcus psicrofilicus* Niño.

Mazza (S.), De Nucci (L. S.), & Feijoo (E. J. C.). **Blastomicosis cutanea de forma lenta por criptococo (n. sp.).** [A slow form of cutaneous blastomycosis due to a new species of *Cryptococcus.*]—*5ª Reunion Soc. Argentina Patol. Region. Norte, Jujuy, 1929*, pp. 293–308, 21 figs., 1930. [Abs. in *Bull. Inst. Pasteur*, xxx, 8, p. 395, 1932.]

A non-thermophilic, pink yeast, *Cryptococcus mitis* n. sp., was isolated from chronic ulcers on a ten-year-old native Argentine child. Only the thick-walled budding forms develop in cultures, without hyphae or asci. The lesions are reported to have originated seven years earlier.

Mazza (S.), Niño (F. L.), & Egüés (A.). **Perionixis blastomicetica por Monilia (n. sp.).** [Blastomycotic perionychia due to *Monilia* (n. sp.).]—*5ª Reunion Soc. Argentina Patol. Region. Norte, Jujuy, 1929*, pp. 284–288, 1 pl., 1930. [Abs. in *Bull. Inst. Pasteur*, xxx, 8, p. 391, 1932.]

A new species of *Monilia, M. inexpectata* [see next abstract],

forming hyphae and blastospores but no asci in culture, was isolated from the nails of a woman at Buenos Aires.

NIÑO (F. L.), FERNANDEZ (J.), & PALANT (M.). **Nuevas observaciones de onixis y perionyxis de origen blastomicosico.** [New observations on onychia and perionychia of blastomycotic origin.]—*6ª Reunion Soc. Argentina Patol. Region Norte, Salta, 1930*, pp. 35–99, 1931. [Abs. in *Bull. Inst. Pasteur*, xxx, 8, p. 391, 1932.]

Observations are made on three new cases of blastomycotic onychia and perionychia, with numerous figures of the lesions obtained in laboratory experiments on animals. One case was attributed to *M. inexpectata* [see preceding abstract], and the two others to *M.* [*Candida*] *krusei* [*R.A.M.*, xi, p. 373].

OLIVER (H. G.). **Bronchomoniliasis in Jersey.**—*Brit. Med. Journ.*, *1932*, 3722, p. 863, 1932.

During the past ten years the writer has examined the sputa of all his patients, both juvenile and adult, showing bronchitic or associated symptoms (chronic cough, dyspnoea, and the like), and in the great majority of cases the presence of *Monilia* [*Candida*] has been detected [*R.A.M.*, vii, p. 578]. The conditions in question are usually relieved by systematic treatment with vaccine and liberal doses of potassium iodide. Since the discovery of the fungus in cow's milk, the boiling or pasteurization of all milk before consumption is recommended. An increase in the number of cases of bronchomoniliasis has been observed during the summer, a fact that may bear directly on the etiology of 'June epidemic pneumonia'. In adults *Monilia* is frequently found together with the tubercle bacillus in the sputa of cases of pulmonary tuberculosis, the inference being that moniliasis is the primary infection.

DA FONSECA (O.) & LEÃO (A. E. de A.). **Las cromoblastomicosis.** [The chromoblastomycoses.]—*5ª Reunion Soc. Argentina Patol. Region Norte, Jujuy, 1929*, pp. 329–350, 1930. [Abs. in *Bull. Inst. Pasteur*, xxx, 8, pp. 397–398, 1932.]

This is a comprehensive and thoroughly documented survey of the chromoblastomycoses or verrucose dermatites. The only case due to *Phialophora verrucosa* was reported from the United States, whereas the Brazilian form caused by *Acrotheca pedrosoi* is much more common, being the subject of 14 published communications apart from simple records. Analogous lesions are stated to have been observed in Russia, Cuba, Sumatra, and the Argentine, but mycological studies have yet to be made. The authors do not agree with Langeron's classification of *A. pedrosoi* as a member of the genus *Trichosporum* [*R.A.M.*, viii, p. 646].

EMMONS (C. W.). **Pleomorphism and variation in the dermatophytes.**—*Arch. of Dermatol.*, xxv, 6, pp. 987–1001, 5 pl. (1 col.), 1932.

Six variants [detailed descriptions of which are given] arose from a single culture of *Achorion gypseum* [*R.A.M.*, x, p. 730] on born, each type of growth preserving its distinctive characters in culture.

Full particulars are also given of variants developing from three strains of *Trichophyton gypseum* [ibid., xi, p. 458]. A striking feature of the *A. gypseum* cultures was that pleomorphism occurred readily in the parent strain, while the variants did not appear to be subject to this change, unless they reverted by sectoring to the original type [cf. ibid., xi, p. 373].

NAKAMURA (T.). **Über die Nageltrichophytie und eine neu entdeckte Pilzvarietät.** [On trichophytosis of the nails and a newly discovered fungus variety.]—*Japanese Journ. of Dermatology*, xxxii, 6, pp. 515–527, 10 figs., 1932. [German summary on pp. 65–66.]

A fungus characterized by branched, septate hyphae, aleuria, terminal or intercalary chlamydospores, gemmae, nodular organs, racket-shaped elements, and stalked, pocket-like appendages with yellow granules was isolated from the severely deformed nails of a girl in Tokyo. On Sabouraud's agar the colonies turned from yellowish-brown to brown with a greenish-yellow edge and eventually to purple; radial furrows and convolutions developed in the centre. The organism is named *Trichophyton coccineum* [*R.A.M.*, x, p. 596] var. *keio* n. var. It was mildly pathogenic on the skin of laboratory animals.

KESTEN (B[EATRICE] M.), ASHFORD (B. K.), BENHAM (R[HODA] W.), EMMONS (C. W.), & MOSS (M. C.). **Fungus infections of the skin and its appendages occurring in Porto Rico. A clinical and mycologic study.**—*Arch. of Dermatol.*, xxv, 6, pp. 1046–1057, 5 figs., 1932.

An account is given of the fungi isolated from 59 out of 80 cases of skin diseases in Porto Rico. These include *Trichophyton gypseum*, *T. plicatile* [*R.A.M.*, x, p. 106], *Endodermophyton tropicale* [*T. concentricum*: ibid., x, pp. 243, 665], *Epidermophyton inguinale* [*E. floccosum*: ibid., xi, p. 458], and *Microsporon lanosum* [ibid., xi, p. 373]. A species of *Hormodendrum* (? *H. olivaceum* or *H. fontoynonti*) [ibid., vii, p. 639], with olive-green mycelium, conidiophores, and conidia, the latter measuring 3·2 to 5·6 by 2·4 to 3·5 μ, was isolated from the squamae of persons affected by superficial depigmentation. *Sporotrichum gougeroti* [see next abstract] was isolated from a case of deep infection of the skin clinically resembling the ecthymatous type of acladiosis (Castellani) [due to *Acladium castellanii*: ibid., vii, p. 240].

BENHAM (RHODA W.) & KESTEN (BEATRICE). **Sporotrichosis: its transmission to plants and animals.**—*Journ. Infect. Dis.*, l, 5–6, pp. 437–458, 15 figs., 1932.

After a brief survey of the history of sporotrichosis in man, animals, and plants, a consideration of the possible sources of human infection, and notes on the classification of species of *Sporotrichum*, the writers give a full account of their studies in New York on *S. schenckii* [*R.A.M.*, i, p. 353; x, p. 106], *S. beurmanni*, *S. gougeroti*, *S. councilmani*, *S. poae* and *S. pruinosum*.

S. beurmanni, isolated from a case of human sporotrichosis, is characterized by creamy, later tan to brown or black colonies with

radiating folds or irregular cerebriform ridges; fine, hyaline, slightly branched hyphae, 1 to 2 μ in diameter; oval or piriform, often dark spores, 3 to 5 by 2 to 4 μ, occurring singly or in clusters on short lateral branches or attached to the sides of the longer hyphae by sterigmata; and abundant coremia. *S. gougeroti*, isolated from a Porto Rican case of sporotrichosis [see preceding abstract] produces round, friable colonies with a smooth, black, velvety surface; a coarse mycelium, often moniliform and pigmented; spores measuring 5·5 by 3·5 μ, often sessile; and budding forms detached from the mycelium. *S. councilmani*, isolated from a case of human sporotrichosis, in Sabouraud's collection, produces tan-coloured colonies, later covered with a coarse, white mycelium, and rounded spores, 4 to 8 μ in diameter, borne terminally on conidiophores. *S. poae*, isolated from diseased carnations (*Science*, N.S., xxi, p. 389, 1905), is characterized by white, fluffy colonies with pink edges on sugar media, coarse hyphae and oval or round, sessile spores, 5 to 9 μ in diameter, arranged in clusters on lateral branches. The colonies of *S. pruinosum* from Iowa soil [*R.A.M.*, vii, p. 57] are slightly membranous, with coarse hyphae, oval or lemon-shaped spores, 9·5 to 13·5 by 6 to 10 μ, borne terminally on branched conidiophores, and numerous chlamydospores.

S. beurmanni, inoculated through wounds into carnation buds, caused a disease resembling spontaneous bud rot in 19 out of 21 cases. The tip of the bud appeared to darken and the calyx to shrivel, while the tissue within the calyx showed a typical soft rot. The organism was demonstrated in the petals and stamens and was recovered in culture. Inoculations on unwounded buds gave negative results. Inoculated into a living rosebud, *S. beurmanni* caused complete rotting. *S. poae*, *S. pruinosum*, *S. councilmani*, and *S. gougeroti* also proved pathogenic to carnation buds (55, 50, 61, and 50 per cent. infection, respectively).

Rats inoculated with *S. beurmanni* after its passage through carnations developed abscesses, tumours, and bone lesions from which the organism was recovered. *S. poae* proved entirely avirulent for rats, while *S. pruinosum*, though producing multiple abscesses in these animals, retained its original morphology in culture and bore little resemblance to any *Sporotrichum* isolated from human sources. It is improbable, therefore, that these species can cause disease in man. The experiments with *S. beurmanni*, however, showing as they do (apparently for the first time) that a human pathogen can infect a plant, open up the possibility that the latter may act as a source of human infection. This supports the view, based on many clinical observations, that sporotrichosis in man results from the contamination of a wound with infected living or dead plant material.

Naoumova (Mme N. A.). Пятнистость стеблей Льна, вызываемая **Ascochyta linicola Naoumoff et Vassilievski.** [Stem spot of Flax caused by *Ascochyta linicola* Naoumoff et Vassilievski.] —*Bull. Plant Protection*, Leningrad, v, 1, pp. 141–160, 2 pl., 3 figs., 1932. [English summary.]

This is a detailed account of experiments in 1930 in the district

of Leningrad for the purpose of elucidating some points in the biology of *Ascochyta linicola* [*R.A.M.*, ix, p. 246; x, p. 731] on flax. It was conclusively shown that the chief source of infection is the soil, although dissemination on infected seed was also demonstrated. The frequency and severity of attack on flax seedlings were less marked when the inoculum (pure cultures of *A. linicola* from three localities) was worked into the soil together with healthy seeds at a depth of 2 cm. than when a layer of 0·5 or 1 cm. clean earth was left between the seed and the inoculum above. From the soil the mycelium developed upwards along the underground parts of the growing seedlings (21·8 to 47·4 per cent. of which were killed before emergence), and formed fructifications at the base of the plants. While heavily infected seedlings soon perished, the more slightly attacked ones were merely delayed in their development but remained stunted throughout their life. Only the cortical tissues of the underground parts were attacked and destroyed by the fungus, the degree of destruction being largely dependent on the relative humidity of the soil, the optimum (both for intensity of attack and for growth of the host) being 60 per cent. of the total water-holding capacity; at 40 and 30 per cent. the fungus developed but slightly and did not injure the seedlings. Air temperature had no apparent influence either on the severity or incubation period of the disease. Artificial inoculations showed that the susceptibility of the flax stems to infection decreased with advancing age, plants over 50 days old (from sowing) being susceptible to infection only through wounds in the cortex. Stem infections developed equally well at all temperatures above 8° C.; below this the disease made but slight progress, and the maximum limit of the extension of the mycelium in the cortical tissue (marked by pycnidial formation) was 5 to 6 cm. upwards from the point of infection. The effect of infection on the growth of the host was dependent in a great measure on the age of the latter: before flowering it usually results in the death of the plant, but later only inhibits the development of fresh organs, such as the bolls and seeds.

Inoculation of the seed bolls showed that the susceptibility of these also decreased as they approached maturity. Under favourable conditions the fungus grew through the walls of the bolls and continued to develop on and in the dissepiments, from which it gained access to the seeds. In the latter the organism was localized in the upper layers of the integument, the formation of pigment inhibiting its further progress inside the seeds. The embryo was only attacked in very young seeds. It was further shown that in the seed the fungus overwinters as mycelium, rarely in the pycnidial stage. The germinability of heavily infected seeds was considerably lowered in comparison to that of healthy seed, and the fungus passed freely from the diseased seed to the seedlings.

FLACHS (K.). **Krankheiten und Parasiten der Zierpflanzen. Ein Bestimmungs- und Nachschlagebuch für Biologen, Pflanzenärzte, Gärtner und Gartenfreunde.** [Diseases and parasites of ornamental plants. A book of identification and

reference for biologists, plant pathologists, gardeners, and garden-lovers.]—558 pp., 173 figs., Stuttgart, Verlag Ulmer, 1931. [Abs. in *Zentralbl. für Bakt.*, Ab. 2, lxxxvi, 8–15, pp. 272–273, 1932.]

This is stated to be a comprehensive account of the diseases and pests of over 150 ornamental plants [cf. *R.A.M.*, xi, p. 245], the various organs of which are discussed in the separate sections. The plants are arranged in alphabetical order of their scientific names, an index of the corresponding German names being given. The fungi and pests enumerated are accompanied by diagnoses and descriptions, control measures being indicated where they are known. An appendix contains a brief list of prophylactic and therapeutic remedies, together with directions for the preparation of sprays and notes on the substances officially tested by the German Plant Protection Service.

WHITE (R. P.). **Diseases of Boxwood, Carnations, China Asters, Chrysanthemums, Delphinium or Larkspur, Gladiolus, Hollyhocks, Iris, Laurel, Peonies, perennial and annual Phlox, Roses, Snapdragons, Sweet Peas, and Tulips.**—*New Jersey Agric. Exper. Stat. Circs.* 230–244, 62 pp., 42 figs., 1931. [Received July, 1932.]

Popular notes are given on the symptoms and control of the diseases of the various flowering or ornamental plants mentioned in the title occurring in New Jersey, the diseases of each host being dealt with in a separate circular. Laurel [*Kalmia latifolia*] is stated to be subject to a leaf spot caused by *Phyllosticta kalmifolia* and leaf blight due to *Phomopsis kalmiae*.

VERPLANCKE (G.). **Une maladie à virus filtrant du Pelargonium zonale.** [A disease of *Pelargonium zonale* due to a filterable virus.]—*Bull. Cl. Sci. Acad. Roy. de Belgique*, Sér. 5, xviii, 3, pp. 269–281, 1 pl., 1932.

Previous references to the occurrence of an obscure virus (leaf curl or mosaic) disease of *Pelargonium zonale* in Germany and Switzerland [*R.A.M.*, vi, p. 729; xi, p. 459] are briefly summarized, and a full account is given of the writer's investigations on a similar phenomenon at Laeken, Belgium.

Angular yellow spots, sometimes star-shaped, occur along the secondary veins of the leaves, which are generally much curled; the centre of the lesion may be whitish, or more often necrotic, and a second star may develop around the first, the two being separated by a narrow strip of tissue. The size of the lesions ranges from $\frac{2}{25}$ to $\frac{3}{4}$ mm. A clearing of the finer veins was observed in some of the young leaves. A very inconspicuous mottling occurs chiefly near the margins of fully developed leaves, while on young ones pale yellow spots, not more than 1 mm. in diameter, often with necrotic centres, may be detected. Certain plants exhibit only livid, translucent, oily, circular spots, up to 4 or 6 mm. in diameter, the centre of which is a normal green surrounded by a paler zone. Both *P. zonale* and *P. hederaceum* exhibit these symptoms.

In the oily spots the palisade parenchyma is not differentiated and there are no lacunae in the spongy parenchyma. The tissue of the star-shaped lesions also consists of a parenchyma of undifferentiated cells.

Infection was not transmissible from diseased to healthy pelargoniums by wounding, rubbing, or root contact, but grafting experiments gave positive results. Inoculated into tobacco plants by wounding or rubbing, the *Pelargonium* virus produced diffuse discoloured lesions on the leaves. The virus of tobacco mosaic was also inoculated by various standard methods into *P. zonale* plants with positive results in up to 40 per cent. of the plants tested.

DODGE (B. O.) & SWIFT (MARJORIE E.). **Black stem-rots and leaf-spots of Pelargonium.**—*Journ. New York Bot. Gard.*, xxxiii, 389, pp. 97–103, 2 figs., 1932.

Many of the new zonal varieties of *Pelargonium* at the New York Botanic Garden have been attacked by a bacterium producing a black stem rot and spotting of the leaves, sometimes followed by defoliation. Of 31 inoculations made with pure cultures of the organism, which may be identical with *Bacterium pelargonii* [*R.A.M.*, x, p. 461], 28 were successful. One seedling was infected by *Pythium splendens* [ibid., xi, p. 330], also causing a black rot of the stems, which shrivel and collapse more rapidly than those attacked by the bacterium, besides bearing darker lesions. Control measures are briefly indicated.

ROTH (E.). **Verbreitete Cyklamenkrankheiten.** [Widespread Cyclamen diseases.]—*Gartenwelt*, xxxv, pp. 592–593, 1931. [Abs. in *Zentralbl. für Bakt.*, Ab. 2, lxxxvi, 8–15, p. 342, 1932.]

Cyclamens in Germany are liable to infection by *Phyllosticta cyclaminis* [*R.A.M.*, ix, p. 786], causing yellowish to brownish spots on the leaves, mostly with a reddish-brown border, which later shrivel and drop out. Of more frequent occurrence is *Septoria cyclaminis* [ibid., vi, p. 164], producing red, concentrically zonate, later grey, circular lesions on the foliage. The spots formed by *Gloeosporium cyclaminis* on the leaves are distinctly zonate, watery, pale green, and circular. In addition to the provision of favourable growing conditions, applications of 1 per cent. Burgundy mixture should be given to control these diseases.

LANDGRAF (T.). **Eine bedenkliche Azaleenseuche.** [A serious Azalea disease.]—*Die kranke Pflanze*, ix, 4–5, pp. 42–43, 1 fig., 1932.

A brief, popular note is given on the occurrence of a *Pestalozzia*, probably *P. guepini*, on the leaves, stems, and branches of *Azalea indica* [*Rhododendron indicum*] at Hamburg [*R.A.M.*, x, p. 705]. The disease assumed epidemic proportions and future outbreaks should be prevented by the application of copper-containing fungicides, e.g., vomasol C, azurin, kurtakol [ibid., x, p. 58], and sulphur-celestina.

Nicolas (G.) & Aggéry (Mlle). **Champignons observés sur deux Viburnum de la section tinus (Viburnum davidi, Vib. tinus).** [Fungi observed on two species of *Viburnum* of the section *tinus* (*Viburnum davidi*, *V. tinus*).]—*Bull. Soc. Hist. Nat. Toulouse*, lxi, 2, pp. 249–252, 1931.

Viburnum davidi leaves in the Toulouse Botanic Garden were observed in 1929 to bear necrotic spots, grey on the upper and reddish-brown on the lower side, with a purplish-brown margin, often falling out and giving a shot-hole appearance to the foliage. Infection takes place through the upper leaf surface. In the tissues of young spots a pale yellow mycelium and numerous small, brown sclerotia may be detected; the latter develop into light brown pycnidia, measuring 117 by 78 μ, with a circular ostiole, through which the hyaline, fusiform, uni- or bi-, occasionally triseptate pycnospores are extruded, their average dimensions being 10 to 11 by 2·5 to 2·8 μ (uniseptate) or 13 by 2·5 to 2·8 μ (triseptate). The fungus appears to be identical with *Ascochyta tini*, occurring on the leaves of *V. tinus* in Italy and Portugal.

The dead tissues of the above-mentioned lesions were invaded by a black mycelium, producing pycnidia measuring 95 to 150 by 78 to 100 μ, with continuous, brownish pycnospores, 2·6 to 5·2 by 2·6 to 3 μ, presumably belonging to *Coniothyrium viburni* Hollós, which is found on dry branches of *V. opulus* in Hungary.

A third fungus, characterized by a coarse, blackish mycelium, brown to black, flattened pycnidia, 140 to 180 by 115 to 150 μ, and hyaline, ovoid or elliptical pycnospores, 10·4 to 13·5 by 5·2 to 6·5 μ, is also found in the desiccated portions of the lesions and is identified with *Macrophoma gloeosporioides* (Sacc.) Berl. & Vogl., previously observed on *V.* sp. in the south of France.

A. tini is obviously an active parasite of *Viburnum* leaves, while the two other organisms are considered to be purely secondary.

Roeder (W. v.). **Die Pilzbekämpfung bei Kakteensämlingen.** [The control of fungi in Cactus seedlings.]—*Blumen- und Pflanzenbau*, xlvii, 6, pp. 88–89, 1 fig., 1932.

Cactus seedlings are stated to be frequently infected by fungi, e.g., *Phytophthora*, which retard their growth and may even render them unmarketable. The writer has obtained excellent control of these organisms by watering the seed-beds with quinosol (ortho-oxy-quinolin-potassium sulphate) [see above, p. 622]. This preparation may be applied either in the form of chinosolum purissimum (2 gm. per 1,000 c.c. water) for large-scale experiments, or as 'chinoblettes' (2 or 4 per l.). Quinosol is absolutely harmless to the plants, causing no injury to three-year-old seedlings at a strength of 5 per cent., and is applicable also to other succulent and Alpine plants.

Antokolskaya (Mme M. P.). **О расах Sclerotinia libertiana Fckl. на Подсолнечнике и на других растениях.** [The races of *Sclerotinia libertiana* Fckl. on the Sunflower and other plants.]—*Bull. Plant Protection*, Leningrad, v, 1, pp. 39–62, 7 pl., 2 graphs, 1932. [English summary.]

A full account is given of the author's continued investigation

of the disease of sunflowers caused by *Sclerotinia libertiana* [*S. sclerotiorum*] in Russia [*R.A.M.*, vi, p. 730]. Cultural experiments in which sclerotia obtained from various regions of the country were grown on a number of natural and artificial media, confirmed the existence of at least two geographical strains of the fungus, namely, a northern and a southern (or Caucasian) race. Under controlled conditions the former was characterized by a poorly developed aerial mycelium and the formation of numerous sclerotia and appressoria on all the media tested, and also by the fact that no apothecia were produced in cultures on oat grains. The southern race gave an abundant mycelium with relatively few sclerotia; no appressoria were formed either on plum agar or oat and wheat grains, and apothecia developed in large numbers on oat grains and oat agar cultures. Although the sizes of the ascospores of the two races were included within the same limits, an analysis by the statistical variation method showed a significant difference in the mean length and width of the spores, but not sufficient to warrant the specific separation of the two races, the more so that the difference could not be detected by simple biometric measurements. Cultures raised from sclerotia obtained from central Russia showed characters intermediate between those of the northern and southern races. Inoculation tests (carried out for one year only and therefore requiring confirmation) showed that sunflowers, tobacco, Jerusalem artichokes (*Helianthus tuberosus*), and hemp (*Cannabis sativa*) are more easily and heavily infected by the southern strain than by the northern, while of the strains isolated from hemp, lupins, potato, safflower (*Carthamus tinctorius*), and tobacco, only that from hemp was pathogenic to the sunflowers.

JAVORONKOVA (Mme I. P.). Бактериальная болезнь корней Клевера, Люцерны и Чечевицы, вызываемая **Bacterium radiciperda n. sp.** [Bacterial root rot of Red Clover, Lucerne, and Lentils caused by *Bacterium radiciperda* n. sp.]—*Bull. Plant Protection*, Leningrad, v, 1, pp. 161–172, 4 pl., 1932. [English summary.]

A brief account is given of a bacterial root rot which was first noticed in 1930 on red clover (*Trifolium pratense*) in the governments of Tver and Orel, Central Russia, and has since been found also to occur on the roots of lucerne and lentils (*Lens esculenta*) in other central districts, in Wolhynia, and in the Lower Volga basin. As seen on red clover in the first year of infection the disease is characterized by the appearance on the collar and at the base of the stems of oblong, dark lesions, under which the vascular bundles are browned and the vessels are filled with bacteria; in the second year the symptoms are intensified and the mortality of the plants may reach 80 per cent., and in the third year the whole of the infected crop is destroyed. The symptoms on lucerne and lentils are not described in detail, but are stated to be very similar to those on clover.

Inoculation experiments confirmed the pathogenicity of the bacterium present in the lesions to all the three hosts mentioned, and indicated that it gains entry through mechanical and insect

injuries to the aerial and underground parts of the plants, while field observations suggested that insects play a considerable part in the dissemination of the disease. A very similar disease was also observed on sainfoin [*Onobrychis viciaefolia*], but the pathogenicity of the organism responsible for this disease has not yet been tested on the other three hosts.

The red clover bacterium, which was isolated and cultured on various media, is named *Bacterium radiciperda* n. sp., with a diagnosis in Russian and English. It is a short, Gram-negative, aerobic rod, rounded at both ends, with two polar cilia, 1 to 2 by 0·8 μ, occurring in pairs or singly; it forms capsules but does not sporulate. On peptone beef-agar the colonies are round, smooth, shining, slightly raised, at first white and later pale yellow. The organism liquefies gelatine, breaks down sugars to acids without production of gases, peptonizes milk, does not form indol, but produces ammonia and hydrogen sulphide. Its optimum temperature for growth is 23° to 25° C., and the thermal death point is 50°.

CORNELI (E.). **Sopra una grave alterazione della Medica prodotta da 'Phyllosticta medicaginis' Fuck. a Perugia.** [On a serious infection of Lucerne caused by *Phyllosticta medicaginis* Fuck. at Perugia.]—*Riv. Pat. Veg.*, xxii, 3–4, pp. 51–58, 1 pl., 1932.

In April, 1931, an extensive area of lucerne growing near Perugia became severely attacked by a disease which produced a necrotic zone at the base of the leaf stalks, causing the leaves to become yellow and wither. Blackish, elongated spots were frequently present on the stalks, and the young leaves when directly attacked showed yellowish spots surrounded by a dark halo. The floral shoots also occasionally withered. Five years previously the disease had been observed near Rome; but it did not reappear after the first crop had been cut, as was also the case at Perugia.

The lesions bore globose, ochraceous, ostiolate pycnidia 100 to 170 μ in diameter. The rod-shaped, hyaline, straight or slightly curved, continuous, or, occasionally, uniseptate spores averaged 5 to 7 by 2·5 to 3 μ. In hanging drop cultures in water the pycnospores after 24 hours measured 8 to 14 by 3 to 4·5 μ; they were mostly transversely septate and slightly constricted at the septum. In 2 per cent. glucose solution septation was much less common and in carrot decoction it was exceptional. On the latter medium the mycelium was olivaceous and pycnidia were produced in 3 days; these pycnidia were up to 350 μ in diameter, variable in shape, and generally without an ostiole.

The author considers that in view of the variability of the spores, some doubt might exist as to whether the organism is a *Phyllosticta* or an *Ascochyta*. He rejects *A. medicaginis* Bres., specific to *Medicago lupulina*; *A. imperfecta* Peck., which has different spore dimensions and symptoms though it frequently shows unicellular spores; and *A. pisi* var. *medicaginis* Sacc., referred provisionally by Sprague to *A. imperfecta* Peck. [*R.A.M.*, ix, p. 274]; but considers his fungus agrees with *P. medicaginis* (Fuck.) Sacc. (*A. medicaginis* Fuckel) in view of the almost constant formation of

unicellular spores both on the natural host and on some artificial media and their germination on suitable media without previous septation. The disease of lucerne attributed by Rosella to *A. medicaginis* Fuck. [ibid., ix, p. 249] is considered to be distinct, as Rosella's fungus had much larger spores.

Artificial inoculation quickly gave positive results under damp but not under dry conditions.

KHOKHRYAKOFF (M. K.). МИКОЛОГИЧЕСКИЕ ЗАМЕТКИ. [Mycological notes.]—*Bull. Plant Protection*, Leningrad, v, 1, pp. 125–129, 1932. [French summary.]

In these notes the author points out that the binomial *Ascochyta trifolii* [for a clover leaf-spotting fungus: *R.A.M.*, vi, p. 99; viii, p. 339] was used by Bondartzeff and Mme Troussova to name a fungus described by them in 1913, and by Siemaszko in 1914 to rename *Phleospora trifolii* Cav. var. *recedens* Massalongo. A careful examination of type material of these two species has convinced him of their identity, and the presence in their stylospores of two or three transverse septa leads him to transfer the organism, in agreement with the taxonomy suggested by Diedecke, into the genus *Stagonosporopsis*. The fungus should henceforth be known under the new combination *S. trifolii* (Cav.) Khokhr.

STIRRUP (H. H.). **Sclerotium rhizodes Auersw. in England.**—*Trans. Brit. Mycol. Soc.*, xvi, 4, p. 308, 1932.

In this note the author reports what appears to be the first record of *Sclerotium rhizodes* [*R.A.M.*, xi, p. 191] from England. The fungus was found attacking and killing the grasses (mainly *Agrostis* spp.) in a meadow about 400 ft. above sea-level in a district of North Derbyshire where rainfall is usually high and the soil is very poor and sour.

Spraying program and pest control in the orchard.—*Ohio Agric. Exper. Stat. Bull.* 500, 8 figs., 4 diags., 4 maps, 1932.

Spray calendars are given for the control of apple, pear, plum, peach, cherry, and grape diseases in Ohio, supplemented by diagrams showing how differently laid out orchards can best be reached by the sprayers. Maps show the distribution in the State of scab [*Venturia inaequalis*], Brooks's spot [*Mycosphaerella pomi*: *R.A.M.*, xi, p. 428], bitter rot [*Glomerella cingulata*], and blotch [*Phyllosticta solitaria*] of the apple.

VERGUIN (J.). **La propagande pour les traitements insecticides et anticryptogamiques des arbres fruitiers dans la région lyonnaise.** [Propaganda for the insecticidal and fungicidal treatments of fruit trees in the Lyons district.]—*Comptes rendus Acad. d'Agric. de France*, xviii, 16, pp. 580–585, 1932.

Further details are given concerning the methods of propaganda employed in the dissemination of instruction on the control of fruit diseases and pests in south-eastern France [*R.A.M.*, xi, p. 246]. During 1931 some thirty machines were distributed among the co-operative organizations in nine departments for experimental

treatments. Between 21st December, 1931, and 22nd March, 1932, 66 demonstrations were held in ten departments, and it is estimated that 4,600 fruit growers have been directly reached by these methods. In one parish in the Loire department 600 l. of anthracene oil were used in the preparation of Bordeaux-oil emulsion mixture in 1930–1 and nearly 2,000 l. in 1931–2.

COUPAN (G.). **Le matériel pour le traitement des arbres fruitiers.** [The apparatus for the treatment of fruit trees.]—*Comptes rendus Acad. d'Agric. de France*, xviii, 18, pp. 621–629, 1932.

In connexion with the campaign now in progress in south-eastern France for the rational treatment of fruit trees against insect pests and fungous diseases [see preceding abstract], some technical details are given of various types of knapsack and motor sprayers tested for these purposes. It was found that, with motor sprayers, perfect results were given only at very high pressures (19 and 28 kg. per sq. cm., nozzle of 1·2 mm. in diameter, and 44 kg., nozzle 2 mm.) [cf. *R.A.M.*, xi, p. 523], though a very good action was obtained at 20 kg. per sq. cm., nozzle 2·0 mm., and at 15 kg., nozzle 1 mm. The best knapsack sprayers were worked at pressures of 4 to 12 kg. with a 2 mm. nozzle or 5 to 10 kg., 1·2 mm. nozzle. A few figures are also given for hand sprayers and for those worked with compressed air.

CUNNINGHAM (G. H.). **Orchard sprays in New Zealand. II. The lime-sulphur series.**—*New Zealand Journ. of Agric.*, xliv, 4, pp. 263–269, 1932.

Continuing his discussions of the orchard sprays commercially used in New Zealand for the control of pests and diseases of orchard trees [*R.A.M.*, xi, p. 582], the author deals with the lime-sulphur series. A useful feature is a table indicating the number of gallons of water to be added to one gallon of concentrated lime-sulphur solution to make a spray of desired strength, irrespective of the brand used, provided the polysulphide content is known. Self-boiled lime-sulphur and dry-mix sulphur-lime are only mixtures of lime and sulphur with a spreader, their fungicidal efficacy being governed solely by the content and type of the sulphur used; colloidal sulphur at the rate of 2 to 4 lb. per 100 galls. water may be advantageously substituted for them. The same is true of the dry lime-sulphur which has been recently put on the market by some United States manufacturers, because of its uncertain composition and high price.

KORDES (H.). **Neue Ergebnisse über die Entwicklung des Erregers der Mauke an Reben und des Wurzelkropfes der Obstbäume und deren Bekämpfung.** [New data on the development of the causal organism of 'mauke' on Vines and of crown gall of fruit trees and their control.]—*Nachricht. über Schädlingsbekämpf.*, vii, 2, pp. 59–66, 7 figs., 1932.

A popular account is given of the history of vine 'mauke' and crown gall of fruit trees in Germany, both caused by *Bacterium tumefaciens* [*R.A.M.*, v, p. 493; vi, p. 147; ix, p. 764], and of recent investigations on the etiology and control of these diseases.

BALAKHONOFF (P. I.). Черный рак плодовых деревьев, **Physalospora malorum (Arn.)—Sphaeropsis malorum Peck.** [Black canker of fruit trees, *Physalospora malorum* (Arn.)—*Sphaeropsis malorum* Peck.]—*Bull. Plant Protection*, Leningrad, v, 1, pp. 3–38, 3 pl., 5 figs., 1 graph, 1932. [English summary.]

This is a considerably expanded version of the author's account of black canker (*Physalospora malorum*) [*P. cydoniae*] of pomaceous trees in the south-east of Russia and north Caucasus [*R.A.M.*, ix, pp. 252, 253], where the disease is stated to be continuing its ravages almost unabated, chiefly owing to the inadequate control measures taken by the local growers. A detailed description is given of the lesions caused by the fungus on the various organs of the trees, with particular reference to those on the bark as the most dangerous form of the disease, and it is stated that in 1929 the organism was observed on the Black Sea littoral of the Caucasus causing a severe blight of pear blossoms, very similar to that caused by *Sclerotinia cinerea* [ibid., x, p. 605]. Control measures, both preventive and curative, are discussed in some detail. The bibliography appended comprises 67 titles.

BROWN (NELLIE A.). **Some pathological studies on Apple cankers.** *Phytopath.*, xxii, 5, pp. 397–414, 2 figs., 1932.

Gloeosporium perennans, hitherto considered to be the causal organism of perennial canker of apples in the Pacific Northwest [*R.A.M.*, xi, p. 248], was not found to be constantly present in otherwise typical cankers. Other fungi and a white bacterium were frequently observed, sometimes in association with *G. perennans*, but just as often without it. Inoculated into apple trees in the Hood River Valley, Oregon, *Alternaria*, *Fusarium*, *Dematium*, *Cladosporium*, and *Penicillium* spp. and the white bacterium produced typical cankers, whereas similar experiments in Virginia gave negative results. *G. perennans* did not infect more readily than the other organisms. In some cases there was canker growth during the autumn following inoculations made with it in the spring of 1929, but no fresh canker development occurred in the next spring. The inoculations made in the spring of 1930 with bacteria and fungi (including *G. perennans*) isolated the year before were mostly healed over when examined in 1931. The winter of 1930–1 was mild and no natural cankers occurred in the Hood River Valley orchards during the following spring and summer.

G. perennans was not used for inoculations in Virginia owing to the risk of introducing the disease into a region hitherto free from it, but *G. musarum* [ibid., xi, p. 382] and *G. cyclaminis* [ibid., ix, p. 186] failed to infect apples in that State, presumably on account of local climatic conditions. Since the cold winter of 1920–1 it has been observed that perennial canker is prevalent in regions subject to low temperatures. Therefore, judging from field observations, the reports of other workers, and the absence of cankers following the mild winter of 1930–1, it is concluded that the disease springs primarily from winter injury, in which the woolly aphis [*Eriosoma lanigerum*] plays a part. The organisms

responsible for canker formation appear to be capable of growth and perpetuation only under the changed conditions obtaining in the cells of winter-injured tissues.

LAUBERT (R.). **Was sollte der Obstzüchter über die sooty-blotch- und fly-speck-Krankheit (Russflecken und Fliegenflecken-Krankheit) der Äpfel wissen?** [What should the fruit grower know about the sooty blotch and fly speck disease of Apples?]—*Mitt. Gesellsch. für Vorratsschutz*, viii, 3, pp., 31–34, 1 fig., 1932.

During the winter of 1929–30 the writer examined apples from the Stade [Schleswig-Holstein] district of Germany bearing sooty blotch spots (*Gloeodes pomigena*, formerly known as *Phyllachora pomigena*, *Asteroma pomigenum*, and *Dothidea pomigena*), which is sometimes considered to be merely a stage in the life-history of *Leptothyrium* (*Labrella*) *pomi*, the causal organism of fly speck [cf. *R.A.M.*, xi, p. 560]. Usually both types of spotting are represented on the same fruit, as in the case of Ananas Reinette apples examined in Germany in 1909, but in the recent above-mentioned consignments only *G. pomigena* was detected. These together with isolated records in 1930 and 1931 appear to be the sole authentic occurrences of fly speck and sooty blotch in Germany, where these blemishes are of little practical importance except as detracting from the market value of the fruit.

WORMALD (H.). **Botrytis cinerea on Apple roots.**—*Trans. Brit. Mycol. Soc.*, xvi, 4, pp. 309–310, 1932.

A brief account is given of a root rot, caused by *Botrytis cinerea*, which was observed at the end of January, 1932, on one-year-old plants of the apple stock East Malling No. 7 which towards the end of the preceding October had been bedded in an apparently healthy condition at the East Malling Research Station. Nearly every stock had one or more main roots dead; some of the dead roots bore sclerotia from 1 to 4 mm. in length, while others bore tufts of *B. cinerea*, and conidiophores were growing out from one of the sclerotia. The condition was only seen on the stocks of this variety, possibly because it produces more fibrous roots than the others used at East Malling, and these may retain an excessive amount of moisture.

ALLEN (T. C.) & RIKER (A. J.). **A rot of Apple fruit caused by Phytomonas melophthora, n. sp., following invasion by the Apple maggot.**—*Phytopath.*, xxii, 6, pp. 557–571, 2 figs., 1932.

A bacterial rot of Wisconsin apple fruits infested by the apple maggot, *Rhagoletis pomonella*, has been observed both in the orchard and in storage. Diseased apples in an advanced stage of decay consist of a fairly firm but shrunken, dark brown mass of rotted tissue. Ripe fruit and sweet, mellow varieties, such as Delicious, Wealthy, and Dudley were found to be more liable to this type of rot than green apples and those of firmer varieties, e.g., Northwestern Greening. Positive results were given by two series of inoculation tests on Wealthy and other varieties with

pure cultures of the bacteria isolated from decaying apples and from the larvae and adults of the maggot.

The causal organism, to which the name of *Phytomonas melophthora* n. sp. is given, is a rod measuring 0·8 to 1·9 by 0·6 to 1·0 μ (average 1·32 by 0·68 μ), motile by means of two polar flagella, Gram-variable, and without spores. Incubated at 20° C. for three days on nutrient glucose agar the colonies were circular, smooth, glistening, convex, finely granular, opaque, and of a light pink colour. Gelatine was not liquefied, starch was not hydrolyzed, and nitrates were not reduced. Acid was formed from arabinose, glucose, galactose, sucrose, levulose, and glycerine, and traces from maltose and mannitol. Growth was most profuse between 21° and 25°.

Baker (K. F.) & Heald (F. D.). **The importance of lenticel infection of Apples by Penicillium expansum.**—*Washington Agric. Exper. Stat. Bull.* 264 (*Tech. Paper*), 15 pp., 3 pl., 1932.

Observations during the last six years at the Washington Agricultural Experiment Station have shown that the blue mould of apples (*Penicillium expansum*) [*R.A.M.*, x, p. 674] is able to penetrate uninjured fruit through the lenticels much more commonly than has been reported in the literature. In spite of stricter grading requirements and improvements in packing equipment since 1925 the annual loss from blue mould has remained fairly constant during this period. Probably certain lenticels on all apples permit infection and evidently certain factors, as yet unknown, tend to increase the prevalence of such lenticels in certain lots of fruit. Lenticel infection, which has been observed in the Jonathan, Delicious, Winesap, Rome Beauty, Arkansas Black, Spitzenberg, King David, and Yellow Newtown varieties, may be one of the principal factors involved in cases of high percentages of fruit rot observed at eastern termini in the United States. Probably the best hope of control lies in the adoption of treatments making for a reduction in the spore load of the fruit, e.g., sanitary practices in harvesting, cleaning, and packing.

Stevens (N. E.) & Nance (Nellie W.). **Efficiency of oiled wraps in the commercial control of Apple scald.**—*Phytopath.*, xxii, 6, pp. 603–607, 1 graph, 1932.

An attempt has been made to evaluate the actual commercial efficacy of oiled wraps [*R.A.M.*, iii, p. 341 and next abstract] in the control of apple scald [ibid., x, p. 114; xi, p. 54] in Washington, the study being based on information supplied by the Food Products Inspection Service of the Bureau of Agricultural Economics, United States Department of Agriculture.

According to C. Brooks (*Official Proc. Internat. Apple Shippers' Assoc.*, xxix, p. 154, 1924), about 600,000 boxes of apples of the 1922 crop went into storage in oiled wraps; in 1923 some 15,000,000 bushels were so treated, and by 1924 the practice was almost universal in Washington and had been adopted to some extent throughout the country. Calculated on the basis of all cars inspected (over 20,000), the percentage of scald in 1922 was 2·8 or slightly below the average for 1917–20; in 1923 it fell to 0·7, and

during the succeeding years the average has been below 0·3 per cent. The number of inspected cars showing scald subsequent to 1923 has averaged only 2·5 per cent. compared with 16·4 and 5·3 per cent. in 1922 and 1923, respectively. No comparable improvement has occurred as regards the losses caused by blue mould [*Penicillium expansum* and other species: ibid., x, p. 674 and preceding abstract], the extent of which was somewhat less than those from scald before the control method was developed, but very much larger under subsequent conditions.

It is significant that the number of inspections requested fell in 1924, after oiled wraps came into general use, to half that demanded in 1922.

ARNAUD (F. W. F.). **Oiled wraps for Apples.**—*The Analyst*, lvii, 674, pp. 307–308, 1932.

Heavy losses among apples stored in an atmosphere of carbon dioxide gas are liable to occur from scald unless the fruit is enclosed in oiled wraps [see preceding abstract]. The minimum amount of oil (medicinal paraffin) required to render these wraps efficacious does not appear to have been determined either experimentally or practically, though 18 per cent. is always recommended. The examination (at the Maidstone County Analyst's Laboratory) of several different consignments of American wraps revealed amounts of oil ranging from 11·5 to 14·9 per cent. All these wraps had been used with success. The oil content of bundles of oiled wraps has been found to remain constant for three months under controlled conditions, but on exposure to the air at ordinary temperatures losses of oil amounting to over 3 per cent. were registered. The writer is convinced, moreover, from an examination of oiled wraps used on apples in a gas store, that considerable quantities of oil are exuded in practice.

SALMON (E. S.) & WARE (W. M.). **Scab on the spur wood and bud scales of the Pear.**—*Gard. Chron.*, xci, 2372, pp. 446–447, 2 figs., 1932.

Between 5th and 11th May, 1932, 20-year-old Roosevelt bush pears at Wye, Kent, showed severe scab (*Venturia pirina*) infection [*R.A.M.*, vi, pp. 12, 212, 672] on all the blossom trusses, the sites of invasion being the pedicels, fruitlets, sepals, and occasionally the petals and main axis of the inflorescence. No infection was observed on the leaves until the 14th May. Pustules of the fungus were present in groups on the one-year-old part of the spur, near or on the leaf scars, and in some cases on the lowest bud scales. No isolated pustules, however, were detected on the scales as in the case of apple scab [*V. inaequalis*: ibid., x, p. 737]. The fact that the scab pustules are found at the extreme apex of the year-old part of the spur suggests that they are the result of summer, rather than spring infection in 1931, while their proximity to the leaf scars in 1932 indicates the conveyance of the conidia to the stem by rain water from the leaf blades or petioles in 1931. A similar occurrence of pustules on one-year-old spur wood was observed on the Fertility, Durondeau, Dr. Jules Guyot, Emile

Heyst, Conference, and Marie Louise d'Uccle varieties, the lowest bud scales also being involved in the two first-named.

The presence of infection on the one-year-old spur wood may require a modification of the accepted methods of scab control, giving only one pre-blossom fungicidal application instead of two, and three after flowering. All infected breastwood should be excised. The prevention of the establishment of infection in the wood by efficient spraying of the foliage must be relied upon rather than seeking a cure.

CURINI-GALLETTI (A.). **Sul mal della gomma. Ricerche, considerazione e commenti.** [On gummosis. Researches, investigations, and comments.]—*Riv. Pat. Veg.*, xxii, 1–2, pp. 11–17, 1932.

After briefly describing chemical investigations into the nature of the exudate found in gummosis of fruit trees in Italy [cf. *R.A.M.*, x, p. 78] and expressing the opinion that the condition is diastatic and probably brought about by bacteria, the author cites the view of Delacroix that oxidation is necessary for gum formation and that of Ruhland that reducing bodies in the medullary rays may inhibit diastatic action. He concludes that the condition may perhaps be arrested by applying a powerful reducing liquid to the wound and preventing contact with the air. Laboratory tests indicated that control may possibly be effected as follows. The affected parts should be removed and the wound washed with a solution of ferrous sulphate, which acts as a disinfectant and a reducing agent, rendering the gummy fluids inoffensive and so permitting the wound to cicatrize completely. Finally, the wound should be painted over with tar.

YOSSIFOVITCH (M.). **Beiträge zur Kenntnis von Polystigma rubrum (Pers.) DC., des Erregers der Lohekrankheit der Zwetsche.** [Contributions to the knowledge of *Polystigma rubrum* (Pers.) DC., the causal organism of Damson scorch.]—*Nachricht. über Schädlingsbekämpf.*, vii, 2, pp. 41–49, 1932.

Damson scorch (*Polystigma rubrum*) [*R.A.M.*, viii, p. 17], a comparatively harmless disease in central and western Europe and the United States, is annually responsible for heavy losses, sometimes reaching epidemic proportions, as in 1928, in Serbia and Bulgaria. The infection period extends from March or early April, when the ascospores are formed, to about the middle of July. The fungus was shown by a series of spraying experiments to be readily controllable by one or more applications of Bordeaux mixture, nosprasit, or nosperit (1 or 2 per cent.), the critical time for the treatment being just at the end of the flowering period.

ROBERTS (J. W.) & PIERCE (L.). **Zinc-lime: a fungicide for the Peach.**—*Phytopath.*, xxii, 5, pp. 415–427, 1932.

Under experimental conditions and in commercial orchards in Indiana, the zinc sulphate-hydrated lime spray (4–3–50) has greatly reduced the incidence of infection by *Bacterium pruni* on

peach trees [*R.A.M.*, xi, p. 520]. Five to seven applications were found to be necessary owing to the occurrence of the disease throughout the spring and summer. The stomata being infection portals, special care must be taken to cover the under side of the leaves, and it is further advisable to reach the young twigs to prevent the formation of new bacterial spot cankers. Fairly severe infection by scab (*Cladosporium carpophilum*) and mild attacks of brown rot (*Sclerotinia fructicola*) [*S. americana*] were also controlled by zinc-lime in experiments on a small scale.

No injury was caused by the treatment, even at twice the strength here recommended; on the contrary, the leaves were often of a deeper green and larger than the controls, while there was some indication of a stimulus to fruit growth. Lead arsenate combined with zinc-lime caused less injury than in conjunction with sulphur fungicides and lime, or lime alone. A mixture of one of the wettable sulphurs commonly applied to peaches against scab and brown rot, and zinc-lime caused no injury to the trees and was reasonably effective in the control of *Bact. pruni*. Zinc-lime in dust form failed to control bacterial spot on the leaves and was less satisfactory than the spray on the fruit.

ZELLER (S. M.). **A Strawberry disease caused by Rhizoctonia.**—*Oregon Agric. Exper. Stat. Bull.* 295, 22 pp., 9 figs., 1932.

Rhizoctonia [*Corticium*] *solani* was the only one of several fungi isolated from the crown and root tissues of wilted strawberry plants in the Willamette and Hood River Valleys, Oregon, which was found to be capable of reproducing the symptoms of the disease in plants grown in sterile soil in pots [*R.A.M.*, x p. 163]. It was also the only one consistently obtained from the characteristic, definite, black lesions on the roots. The disease has been reported from Washington, Michigan, and Utah, as well as Oregon. The symptoms are very similar to those of the *Leptosphaeria coniothyrium* and *Pezizella lythri* diseases recently described in Michigan [ibid., xi, p. 251], and confusion is liable to arise from the fact that all three have been termed 'black root disease'. Purpling of the veins occurs as well as wilting, and very slight infections may persist two or three years with merely a dwarfing effect on the plant. In the autumn marginal yellowing of the leaflets may be observed. Sometimes the leaves become erect, crisp, and gorged with starch, similar to those of potato plants affected by the same fungus.

In Oregon the *Rhizoctonia* disease is usually found in the residual hill soils of a reddish-brown clay loam at the foot of the Cascade Mountains, where cultural conditions are most favourable to the growth of the susceptible Marshall and Clark's Seedling varieties. Other susceptible varieties include Corvallis, Gold Dollar, Nick Ohmer, Improved Clark, and Magoon. The Ettersburg 121 and the wild coast strawberry (*Fragaria chiloensis*) are almost or quite immune. Infection has been observed on the field and wood strawberries (*F. cuneifolia* and *F. californica*), while the bracken fern, *Pteridium aquilinum* [var.] *pubescens*, a common native of the hill soils, is also frequently attacked by *C. solani*, which seems to be endemic in the region under discussion. The

most promising means of control seems to lie in the planting of vigorous stock of resistant varieties and in crop rotation.

STEVENS (N. E.). **United States of America: some diseases of small fruits.**—*Internat. Bull. of Plant Protect.*, vi, 5, pp. 73–74, 1932.

According to R. F. Poole, anthracnose [*Plectodiscella veneta*] of dewberries [*Rubus* sp.] was of minor importance in the Sandhill region of North Carolina from 1926 to 1929, inclusive [*R.A.M.*, x, p. 506]. In 1930 there was a definite increase of infection on the leaves and canes of the Lucretia variety, and in 1931 a large proportion of the crop was destroyed by the disease.

In 1931 the Massachusetts cranberry crop, comprising some three-quarters of that of the whole of the United States, showed an unusually high incidence of storage rots [ibid., xi, p. 188]. Test storage lots showed on 15th November 31, 14, and 30·5 per cent. rotten berries in the Early Black, Howes, and miscellaneous varieties, respectively, the corresponding figures for 1928, 1929, and 1930 being 7·4, 11, and 13·1 per cent. for Early Black, 6·5, 9, and 6·7 for Howes, and 12·2, 18, and 15·6 for miscellaneous varieties. The poor keeping quality of the crop in 1931 was apparently correlated with exceptionally high temperatures in May and June combined with an abnormally heavy rainfall in July and August.

STEVENS (F. L.) & CELINO (M. S.). **Papaya leaf spot.**—*Philipp. Agric.*, xxi, 1, pp. 9–14, 3 figs., 1 graph, 1932.

Papaw leaves in the Philippines often bear small, yellowish-brown, water soaked lesions, with a greyish centre at maturity, 8 mm. to 1 cm. in diameter, on both surfaces of which (especially the lower) a *Helminthosporium* develops profusely. The fungus is characterized by brown, erect, septate, simple, solitary conidiophores, up to 600 μ in length, bearing at their apices pale, 4- to 9-septate conidia, 17·2 to 123 by 11 to 21 μ, tapering towards the apex. Associated with the *Helminthosporium* on some of the spots (under 5 per cent.) are minute, dark brown, spherical bodies which are the perithecia of *Mycosphaerella caricae* Syd. [*R.A.M.*, v, p. 136].

The *Helminthosporium* was readily isolated on potato dextrose agar and other standard media and identified as *H. papayae* (*Ann. Mycol.*, xxi, p. 105, 1923), and reinoculated into papaw plants with positive results. It is thereby proved to be the cause of the leaf spot.

Sphaerella caricae Maubl. (*Bull. Soc. Myc. France*, xxix, p. 358, 1913) is regarded by Saccardo as synonymous with *M. caricae*, the only apparent difference between the two being the absence of constriction in the ascospores of the latter. The examination of local material, however, indicates that at maturity the ascospores become constricted. The association of *S. caricae* and *H. papayae* was thought by Maublanc to suggest genetic relationship, but though *S. caricae* and *M. caricae* [the Latin diagnoses of which are given] may be regarded as identical, the connexion between the latter and *H. papayae* is believed by the authors to be accidental.

GRAHAM (J. J. T.). **Report on insecticides and fungicides.**—*Journ. Assoc. Official Agric. Chemists*, Washington, xv, 2, pp. 169–176, 1932.

The volatilization and precipitation methods for the determination of mercury in seed disinfectants designated I and II, respectively, and adopted as official (first action) in 1930 [*R.A.M.*, x, p. 807], were again tested collaboratively.

Three samples obtained from commercial sources were used for this work, No. 1 containing hydroxymercurichlorophenol sulphate, No. 2 ethyl-mercury-chloride, and No. 3 hydroxymercurichlorophenol. Sample 1 was entirely soluble, differing in this respect from 2 and 3, which contained large quantities of insoluble fillers. In sample 2 the filler was dark and was not whitened by the hydrogen peroxide, so that it was difficult to determine the point at which oxidation was completed. Both the methods were finally adopted officially for the determination of mercury in organic mercurial seed disinfectants, a note being appended to method II concerning the necessity of a sufficient quantity of peroxide to oxidize the organic matter.

Bubb's method of determining the lead and copper contents of Bordeaux-lead arsenate mixtures [loc. cit.] was tested on two samples, one a commercial product, and the other prepared by the referee and containing an unusually small amount of lime in proportion to copper, in addition to 14·37 per cent. sulphur trioxide. The results obtained by this method were not so consistent as those obtained by the official method (*Journ. Assoc. Official Agric. Chemists*, pp. 51–52, 1925), but certain modifications were made to overcome this difficulty and further tests will be conducted.

DELAGE (B.). **The solubility of copper in anticryptogamic products and its importance.**—*Chimie & Indus.* (Special Number), xxvii, pp. 853–858, March, 1932. (French.) [Abs. in *Chem. Abstracts*, xxvi, 13, pp. 3608–3609, 1932.

The solubility of the copper in Bordeaux mixture and similar products was studied by a modification of the Callan and Henderson method (*Chem. Abstracts*, xxiv, p. 312). It is stated that after the excess of soluble copper has been washed away by rain, the amount of copper dissolved is considerably less than the toxic dose for [vine] mildew [*Plasmopara viticola*], the destruction of which is apparently due to the accumulation of copper ions on the surface of the zoospores, where they may attain a concentration 100 to 1,000 times greater than in the solution.

BOUTARIC (A.), DOLADILHE (M.), & PIETTRE (M.). **Sur l'emploi des matières colorantes comme agents anticryptogamiques, dans les maladies des végétaux.** [On the use of dyes as fungicidal agents in plant diseases.]—*Comptes rendus Acad. d'Agric. de France*, xviii, 24, pp. 819–824, 1932.

In connexion with a study of some of the dyes to which fungicidal properties are attributed, especially against vine mildew [*Plasmopara viticola*], e.g., Victoria blue, night blue, the yellow and orange derivatives of acridine, and auramine [see above, p. 622], all of which are colloidal with positive granules, the

authors observed that most of the adhesives used to reduce the superficial tension of these substances (brecolane, bile salts, oleate of soda, and the like) form colloids with negative granules in contact with the water of solution. The electro-positive colloid (dye) begins to flocculate as soon as the concentration of the electro-negative colloid reaches a certain value (C^1), and this process persists up to a certain value (C^2) of the concentration of the negative colloid, whereupon it ceases completely. However, with a concentration of the negative colloid exceeding the value of C^2, the granules of the original colloidal solution are found to have become negative instead of positive.

When the granules of the dye become negative the substance is no longer capable of fixation on cellulose to any extent. Even with concentrations of the adhesive near C^2, at which flocculation is extremely slow, the fraction of the dye fixed is greatly reduced as compared with the same substance without an adhesive. Thus, the proportions of dye fixed when 0·5 gm. cellophane was introduced into solutions of 0·25 gm. per l. with brecolane were as follows: yellow and orange acridine 3 and 6 per cent., respectively, Victoria blue 0 per cent., and auramine 5 per cent., the corresponding figures for the dyes in a pure state being 80, 76, 84, and 85 per cent., respectively. Similar data were obtained in the case of the other adhesives, using cellophane and cotton as the cellulosic materials. It was further demonstrated that the mycelium of *Mucor mucedo* fixes the dyes strongly in the absence of an adhesive but not with an adhesive at a concentration above the indicated limits.

[A condensed version of this paper appears in *Rev. de Viticulture*, lxxvii, 1989, pp. 85–86, 1932].

PASTAC (I.). **Constitution of organic dyestuffs and their anti-cryptogamic action.**—*Chimie & Indus.* (Special Number), xxvii, pp. 851–861, March, 1932. (French.) [Abs. in *Chem. Abstracts*, xxvi, 13, p. 3608, 1932.]

The results obtained to date in the course of an extensive, but as yet incomplete, investigation on the fungicidal properties of dyes [e.g., to vine mildew (*Plasmopara viticola*): see preceding abstract] permit the formulation of the following general rules. The anti-cryptogamic action increases with the molecular weight to a maximum and then falls off sharply. Sulphonation almost entirely destroys the fungicidal properties, which are increased, on the other hand, by the substitution of an NR_2 for an NH_2 group. Certain fluorescent dyes are more active, especially *in vitro*, when exposed to sunlight, but some of these, notably phosphine acridine, exhibit their activity only in contact with leaves.

PLAUT (M.). **Über die Entwicklung von Beizverfahren, über Beizmittel und ihre Anwendung in Saatzuchtbetrieb.** [On the development of steeping methods, on fungicides and their application in the seed selection industry.]—*Zeitschr. für Züchtung*, A, xvii, 3, pp. 304–340, 19 figs., 1 diag., 3 graphs, 1932.

A comprehensive account, supplemented by 23 tables and numer-

ous bibliographical references, is given of the development, especially during the last 25 years in Germany, of the various methods of seed-grain and vegetable seed disinfection against parasitic diseases. Most of the recent work on which the survey is based has been noticed in this *Review*.

MORSTATT (H.). **Bibliographie der Pflanzenschutzliteratur: das Jahr 1931.** [Bibliography of plant protection literature for the year 1931.]—*Biol. Reichsanst. für Land- und Forstwirtsch.*, Berlin-Dahlem, 251 pp., 1932.

This bibliography of German and foreign literature published during 1931 on various aspects of phytopathology and plant protection has been compiled on the usual lines [cf. *R.A.M.*, x, p. 679].

DRAYTON (F. L.). **The sexual function of the microconidia in certain Discomycetes.**—*Mycologia*, xxiv, 3, pp. 345–348, 1932.

After a brief reference to the hypotheses expressed by former workers in regard to the nature and functions of microconidia in Discomycetes, the author states that he succeeded in inducing the formation of apothecia by *Sclerotium gladioli* [*R.A.M.*, vii, p. 724] by placing the microconidia from one thallus on certain structures (termed receptive bodies) developing on another thallus. In his experiments he used seven isolations of *S. gladioli*, namely, four from the garden gladiolus, one from a variety of the *Gladiolus nanus* type, one from crocus, and one from freesia. When monohyphal cultures of these isolations were grown on suitable media under proper moisture and temperature conditions [details of which are left for a further paper], they developed a discontinuous layer of sclerotized tissue with scattered sclerotia. From this crust there arose more or less columnar, brown or light brown receptive bodies, about 1 mm. high, covered with short protruding hyphae. When microconidia from the crocus strain were placed on the receptive bodies of any of the other six strains (a process which is named 'spermatization'), or microconidia of any of the latter on the receptive bodies of the former, these promptly developed into apothecial fundaments and, on exposure to light, expanded into mature apothecia, the whole process requiring from six to seven weeks from the initiation of the cultures. Receptive bodies which were subjected to the same conditions but not spermatized, proliferated to some extent but never developed into apothecia; the two groups represented by the crocus strain and the other six isolations were also self sterile. There was evidence that diploidization does not result from vegetative fusion, as indicated by the fact that no apothecia developed when the hyphae of the two thalli in paired cultures intermingled, even though receptive bodies were abundantly produced by the two thalli and these belonged to reciprocally interfertile strains. It is believed to be highly probable that this sexual mechanism exists, with perhaps slight modifications, in all the spermatia-producing Ascomycetes, including

in the term spermatia microconidia of the type of those in *S. gladioli*.

The apothecia produced in the experiments were typical of those found in *Sclerotinia*, and *Sclerotium gladioli* must therefore be placed in this genus. So far only the two sexual strains or races, one represented by the isolation from crocus, and the second by the remaining six isolations, have been found.

ROEMER (T.). **Immunitätszüchtung.** [Breeding for immunity.]—*Pflanzenbau, Pflanzenschutz u. Pflanzenzucht*, viii, 11, pp. 261–265, 2 diags., 1932.

Particulars are given of some hybridization experiments conducted at Halle in connexion with the scheme of breeding wheat varieties immune from *Puccinia glumarum* and *Ustilago tritici*, barley from *U. nuda*, and beans (*Phaseolus*) [*vulgaris*] from *Colletotrichum lindemuthianum*.

The yellow rust-susceptible Peragis summer wheat was crossed with the resistant Normandie variety with successful results, the ratio of resistant to susceptible plants in the F_3 generation being 6 : 10. The inheritance of resistance was obviously dependent on a single factor. A cross between Chinese 166, which is immune from *P. glumarum* but highly susceptible to cold, and the rust-susceptible but cold-resistant Strube's Dickkopf yielded strains combining the desirable qualities of both parents.

The Grüne Dame summer wheat variety is practically immune from loose smut, and this quality has been inherited by Peragis (a cross between Grüne Dame and Blaue Dame). However, a new physiologic form of *U. tritici* has now arisen on Peragis [*R.A.M.*, vii, p. 435] which attacks Grüne Dame to the extent of 86·61 per cent. while scarcely affecting Roter Schlanstedt. From crosses between Grüne Dame and (*a*) v. Rümker's Dickkopf, and (*b*) Roter Schlanstedt, new combinations have been produced combining resistance to the local strain of *U. tritici* as well as to that occurring on Peragis. Both are somewhat susceptible to the physiologic form Kleinwanzleben 368/20 (18 to 27 per cent. infection) but react differently to that from Turkey, the hybrid of Grüne Dame and Roter Schlanstedt (9493) being immune while the Grüne Dame and Dickkopf cross (9357–60) is susceptible. A physiologic form of *U. tritici* from the Argentine produced 52·5 and 31·6 per cent. infection on the latter in 1930 and 1931, respectively, the corresponding figures for the Grüne Dame and Roter Schlanstedt hybrid being 49.3 and 28·1, for the Grüne Dame parent 67·4 and 52·9 in 1930 and 1931, respectively, and for Roter Schlanstedt 84·6 and 59·7 per cent. in the two years. The new combinations yielded equally well with the prolific Roter Schlanstedt.

In Württemberg the inheritance of immunity from *U. nuda* was found to be dominant in crosses between the susceptible Heil's Franken barley variety and the resistant Walpersii, and a number of the new combinations further possessed the desirable qualities of early ripening, productivity, and resistance to lodging.

The work by Schreiber on the development of beans resistant to *C. lindemuthianum* has been noticed from another source [see above, p. 618].

Müller (K. O.). **Über die Erzeugung krankheitsresistenter Pflanzenrassen.** [On the production of disease-resistant plant strains.]—*Pflanzenbau, Pflanzenschutz u. Pflanzenzucht*, viii, 11, pp. 265–271, 1932.

A general survey of the underlying principles, the achievements hitherto obtained, and the future prospects of breeding cultivated plants for freedom from disease is followed by an account of recent work among various crops, with special reference to the development of strains of potato resistant to *Phytophthora* [*infestans*: *R.A.M.*, x, p. 545].

McKay (M. B.) & Dykstra (T. P.). **Potato virus diseases: Oregon investigations 1924–1929.**—*Oregon Agric. Exper. Stat. Bull.* 294, 40 pp., 17 figs., 1932.

A full account is given of the results obtained during six years' field and greenhouse studies (1924–29) at the Oregon Agricultural Experiment Station with a number of different virus diseases maintained on several potato varieties.

The chief symptoms and differential characters are described for the mild, interveinal, crinkle, rugose, and leaf-rolling mosaics, leaf roll, spindle tuber, calico [*R.A.M.*, xi, p. 320], giant hill, and witches' broom [cf. ibid., xi, p. 595]. The leaf mutilation method was found to be effective in the transmission of mild, crinkle, rugose, and leaf-rolling mosaic, calico, and spindle tuber, but not leaf roll, while the same four mosaics, leaf roll, and spindle tuber, but not calico, were transmitted by the core-graft method [ibid., v, p. 442; x, p. 263]. Crinkle, rugose, and leaf-rolling mosaic and leaf roll, but not mild mosaic, were transmitted by *Myzus persicae*. *Illinoia solanifolii* [*Macrosiphum gei*] transmitted leaf-rolling mosaic and leaf roll, but was less efficient with the latter than the other aphids. It did not transmit mild, crinkle, or rugose mosaic. *Myzus* [*Macrosiphum*] *pelargonii* transmitted leaf-rolling mosaic and leaf roll [ibid., x, p. 163] but not mild, crinkle, or rugose mosaic, while *M. circumflexus* conveyed crinkle and rugose mosaic and leaf roll, but not mild mosaic. Rugose mosaic passed from diseased to healthy plants under insect-proof field cages in the apparent absence of any kind of insects on the aerial organs. Mild mosaic (to which the Irish Cobbler variety appears to be resistant), interveinal mosaic, and leaf roll were not transmitted in this way. Giant hill seems to pass from diseased to healthy plants when the roots are disturbed by deep cultivation.

Tests showed reductions in yield amounting to 73 per cent. by weight in the case of spindle tuber, and 50 and 19 per cent., respectively, for crinkle and interveinal mosaics.

The roguing of seed plots by the tuber-unit method was found to be more satisfactory for the elimination of virus diseases than the mass roguing method. The tuber-indexing method [ibid., x, p. 681] was most effective for the eradication of virus infections from seed stocks but is considered impracticable for general farm use. Hill-indexing failed to give reliable control [ibid., iii, pp. 297, 549].

ESMARCH (F.). **Die Blattrollkrankheit der Kartoffel.** [The leaf roll disease of the Potato.]—*Monographien zum Pflanzenschutz*, 8, 91 pp., 6 figs., Berlin, J. Springer, 1932.

This monograph on potato leaf roll is divided into the following sections: introduction (history, geographical distribution, and economic importance); histology; physiology, including carbohydrate and albumin metabolism, respiration, and transpiration; transmission, natural (by tubers, seed, soil, insects, contact, and weeds) and artificial; influence of external factors (climate and weather, soil and site, manuring and cultivation); internal factors governing reaction to the disease, viz., variety, stage of development, and maturity, storage, and germination of seed potatoes; etiology (virus and physiological theories); and control.

Discussing the etiology of the disease, the writer inclines to the view that the causal virus is a living entity rather than an enzymatic or toxic substance [cf. *R.A.M.*, vii, p. 341 *et passim*]. Against so much positive evidence in favour of the virus theory, the physiological hypotheses of Merkenschlager [ibid., xi, p. 395], Schweizer [ibid., x, p. 332], and Schander [ibid., vi, p. 686; vii, p. 460] can scarcely be maintained on their present negative basis. A possible explanation of the divergent views, as regards Germany, is the occurrence of the disease in two forms, one of which is transmissible by insects while the other, possibly of ecological origin, cannot be disseminated by this means. This interpretation of the leaf roll problem is discussed by Laske (Vortrag i. d. zool.-bot. Sektion Schles. Ges. f. vaterländ. Kultur, 1929. Manuscript).

Forty-fifth Annual Report of the Agricultural Experiment Station of Nebraska for the year ending June 30, 1931.—52 pp., 1932.

The following items of interest occur in the section of this report on plant diseases (pp. 31–34) by G. L. Peltier and his collaborators. The incidence of potato scab [*Actinomyces scabies*: *R.A.M.*, ix, p. 403] appears to depend more on environmental conditions than on inherited or tuber-line differences. Time of planting was a most important factor in scab development, early strains planted late giving better results than late ones planted early.

A further study of seed potato production in eastern and central Nebraska confirmed previous results showing that good seed stock can be raised from virus-free seed [ibid., ix, p. 51]. Triumph tubers are highly susceptible to cracking during harvesting; the fissures are very deep and serve to admit rot-producing organisms. Experiments showed that cracking is most prevalent on large, immature, turgid tubers, especially when dropped on the edge. Tubers exposed to the air for a few hours developed great resistance to cracking, which was further prevented by a coating of dirt on the digger rods and the padding of picking baskets.

JØRSTAD (I.) & LUNDEN (A. P.). **Investigations on the inheritance of immunity to wart disease (Synchytrium endobioticum [Schilb.] Perc.) in the Potato.**—Reprinted from *Meld. Norges Landbrukshøiskole, 1932*, 19 pp., 1 fig., 1932. [Norwegian summary.]

The results [which are fully discussed and tabulated] of green-

house tests and field experiments conducted from 1928 to 1931 at the Botanical Museum, Tøien, Oslo, on the inheritance of immunity from wart disease (*Synchytrium endobioticum*) in the potato [*R.A.M.*, x, p. 204; xi, p. 321] showed that susceptible varieties, e.g., Centifolia, Sagerud, Marius, and Early Puritan, when self-fertilized or crossed with another susceptible variety, yielded only susceptible progeny. The immune varieties Hindenburg, Pepo, Flourball, Tannenberg, Seydlitz, and Richter's Jubel segregate by self-fertilization in an approximate 3:1 ratio of immunes and susceptibles, and might therefore all be considered heterozygous for a single factor (X) determining the mode of reaction to wart disease, immunity being dominant to susceptibility. The immunity factor may or may not be identical in the different varieties. Susceptibility must therefore be recessive to immunity, as already shown by Salaman and Lesley [ibid., iii, p. 170], contrary to the views of Collins (*Gard. Chron.*, lxx, pp. 260, 271, 290, 314, 326, 1921).

Crossing of immune and susceptible varieties gave divergent results. In some crosses segregation occurs in a 1:1 ratio of immunes to susceptibles, as would be expected from the above data, showing that immunity is dependent on a single, segregating factor in the immune parent. One cross between an immune and a susceptible variety (Golden Lass × Centifolia) segregates in an approximate 3:5 ratio of immunes and susceptibles, immunity probably depending on two complementary factors Y and Z, for both of which Golden Lass is heterozygous while Centifolia is heterozygous for one and recessive for the other (Yy Zz × Yy zz). In other immune × susceptible crosses, with Richter's Jubel as the immune parent, segregation takes place in a ratio of approximately 5 immune : 3 susceptible plants, indicating that the variety in question carries, in addition to the immunity factor X, the factor Z in a heterozygous condition, while the other parent (Early Puritan, Louis Botha, or Sagerud) contains the complementary factor Y, also heterozygous (xx Yy zz × Xx yy Zz). The complementary factors Y and Z appear to be independent of X in producing immunity and X to be independent of Y and Z.

Different results were given by crossing the two immune varieties Edzell Blue and Kerr's Pink with Richter's Jubel, the approximate ratios of diseased to healthy plants being 1:7 and 1:15, respectively. These results are explicable on the basis that Edzell Blue is of the genotype Xx YY zz, Kerr's Pink Xx X′x YY zz and Richter's Jubel Xx x′x′ yy Zz, the immunity factors X and X′ being apparently independent of each other and of Y and Z.

JØRSTAD (I.). **Beretning om plantesykdommer i land- og hagebruket. VII. Sopp- og bakteriesykdommer på Poteter.** [Report on plant diseases in agriculture and horticulture. VII. Fungous and bacterial diseases of Potatoes.]—Reprinted from *Landbruksdirektørens Beretning, Tillegg C*, 63 pp., 4 figs., 1932.

Notes are given on the following potato diseases occurring in Norway from 1924 to 1931: late blight (*Phytophthora infestans*), dry rot (*Fusarium coeruleum* and other species), sclerotial disease

(*Sclerotinia sclerotiorum*) [*R.A.M.*, vii, p. 8], grey rot (*Botrytis cinerea*), verticilliosis (*Verticillium albo-atrum*), black scurf (*Corticium vagum*) [*C. solani*], powdery scab (*Spongospora subterranea*), flat scab (*Actinomyces scabies* and other species), skin spot (*Oospora pustulans*), silver scurf (*Spondylocladium atrovirens*), ring bacteriosis (*Bacterium sepedonicum*) [ibid., viii, pp. 288, 458], bacterial stalk rot (*Bacillus carotovorus*) [ibid., x, p. 125], also mainly responsible for a soft rot of stored tubers, and 'internal rust spot' [see next abstract].

GHIRENKO (V. N.). К вопросу о влиянии реакции и влажности почвы на развитие железистой пятнистости в клубнях Картофеля. [Note on the problem of the influence of soil reaction and moisture on the development of internal rust spot in Potato tubers.]—*Bull. Plant Protection*, Leningrad, v, 1, pp. 65–72, 1 fig., 1932. [English summary.]

Internal rust spot of potatoes [*R.A.M.*, x, p. 746] is stated to be very prevalent in light, sandy soils in the region of Novozybkoff, western Russia. Experiments carried out in 1930, in which potato tubers affected with the disease were grown in a series of containers with soil, the reaction of which was adjusted to P_H values ranging from 4·31 to 7·7, showed that plants grown in soil of P_H values up to 5·79 remained healthy, while at the higher P_H values the incidence and severity of the disease increased together with this value and attained their maximum at the top of the scale. Tests in 1929 and 1930 showed that soil moisture has no apparent bearing on the development of internal rust spot.

[NATTRASS (R. M.).] **Late blight of Potatoes.**—*Cyprus Agric. Journ.*, xxvii, 2, pp. 65–68, 2 figs., 1932.

Popular notes are given on late blight of potatoes (*Phytophthora infestans*), which was reported for the first time in Cyprus during 1931, when a slight outbreak occurred in the Famagusta district. Immediate steps were taken to restrict the disease to the affected area, with the result that the autumn crop appeared to be quite healthy. Early blight (*Alternaria solani*) also occurs in the island but is of minor importance.

LUNDEN (A. P.). **Versuche mit neuen immunen Kartoffelsorten im Versuchsgut Vollebekk in Aas.** [Experiments with new immune Potato varieties at the experimental farm Vollebekk in Aas.]—*Meld. Norges Landbrukshøjskole*, xi, p. 193, 1931. (Norwegian.) [Abs. in *Fortschr. der Landw.*, vii, 14, p. 376, 1932.]

Comparative tests carried out from 1928 to 1930 with 34 potato varieties, including 20 English and 11 German, showed that under local Norwegian conditions, the late maturing Hellena, Beseler, and Arran Consul are the most resistant to *Phytophthora* [*infestans*: cf. *R.A.M.*, vii, p. 595].

BARRUS (M. F.). **Seed treatment of Potatoes in New York State.**—*Amer. Potato Journ.*, ix, 5, pp. 73–75, 1932.

During 1931 the number of bushels of seed potatoes treated by

1,380 farmers in 11 counties of New York State by the hot mercuric chloride dip amounted to 133,568, the average cost of the treatment, which was used against *Rhizoctonia* [*Corticium solani*] and scab [*Actinomyces scabies*], being 4·01 to 7 cents per bushel. The use of mercury compounds for fungicidal purposes is stated to be increasing yearly, partly as a result of the researches of F. M. Blodgett on calomel and the slightly more soluble yellow oxide of mercury [*R.A.M.*, vii, p. 666]. In 1931 1,589 farmers used cold mercuric chloride compared with 657 in 1930; 2 and 40 used hot and cold formaldehyde, respectively; and 642, 192, and 1,242 employed yellow oxide of mercury, calomel, and semesan bel, respectively, as against 57, 278, and 683 in 1930. The total number of bushels treated in New York State in 1931 (including the hot mercuric chloride estimates) was 408,926, compared with 208,905 in 1930.

WALKER (O. F.). **Testing the strength of corrosive sublimate in the treating of seed Potatoes.**—*Amer. Potato Journ.*, ix, 5, pp. 75–77, 1 diag., 1932.

Directions are given for testing the strength of the mercuric chloride solutions used for treating potatoes [against *Corticium solani* and *Actinomyces scabies*: see preceding abstract] by means of potassium iodide. After a batch of potatoes has been treated in the stock solution (4 oz. mercuric chloride in 30 galls. water) sufficient of the solution is added to a test solution (containing 5 gm. potassium iodide and a very little copper sulphate in 1,000 c.c. of water) to produce a uniform red cloudiness. A specially graduated measuring glass is used for the purpose. According to the quantity of the solution required to do this a corresponding amount of concentrated mereuric chloride solution (2 oz. in 1 qt.) is added to the contents of the treating tank. This method has been found to save both time and money, a batch of potatoes being treated in 35 minutes without emptying the tank, and about $3 worth less mercuric chloride per 250 bushels being required.

GÜSSOW (H. T.) & FOSTER (W. R.). **A new species of Phomopsis.** —*Canadian Journ. of Res.*, vi, 3, pp. 253–254, 2 pl., 5 figs., 1932.

English and Latin diagnoses are given of a fungus independently isolated by both writers in the autumn of 1930 from the lesions of a characteristic hard stem-end rot of potatoes from Vancouver, British Columbia. The organism, which is named *Phomopsis tuberivora* Güssow & Foster sp. n., is characterized by dothideoid, sessile, cushion-shaped to variable, sclerotioid, coal-black, single or occasionally confluent, indistinctly papillate pycnidia, 0·25 to 0·50 by 1 to 2 mm., at first innate in a stroma, later erumpent; hyaline, unicellular, fusiform, guttulate conidia, minimum, modal, and maximum lengths, 7·11, 11·85, and 13·03 μ, respectively, width 4 to 6 μ, borne on persistent, subulate, simple conidiophores, 15 to 18 by 1·5 μ, septate at the base. Stylospores or B spores [*R.A.M.*, x, p. 279] were only found twice, once on a diseased tuber and once in a culture on cooked barley seed; they were filiform, curved or straight, and measured 8 to 30 by 0·5 to 1·5 μ.

REDDICK (D.). **Some diseases of wild Potatoes in Mexico.**—*Phytopath.*, xxii, 6, pp. 609–612, 1932.

This is an expanded account of the writer's observations on the diseases of wild potatoes in Mexico, a preliminary note on which has already been published [*R.A.M.*, xi, p. 397]. The 'spot' disease of *Solanum demissum* is characterized by lesions resembling those due to *Alternaria solani*, except for the absence of target lines. One leaf may bear a good many spots, the tissue between which turns yellow and the whole leaf dies, though usually remaining attached to the stem. At this stage the plant exhibits all the symptoms of late blight (*Phytophthora infestans*) but no trace of that organism could be detected. Shoots arising from long stolons in the same pots as heavily infected parent plants may be entirely free from the disease, which for the time being must be regarded as of physiological origin. A similar condition has previously been observed on *S. demissum* in the greenhouse at Ithaca, New York.

The collection of *Puccinia pittieriana* on *S. demissum* extends the range of this rust considerably. Blight (*Phytophthora infestans*) does not seem to have been previously reported from Mexico on wild plants. It was only seen on *S. antipoviczii*.

SHARPLES (A.). **Annual Report Pathological Division.**—*Ann. Rept. Rubber Res. Inst. Malaya, 1931*, pp. 76–87, 1932.

Investigations by R. P. N. Napper on the root disease of *Hevea* rubber caused by *Fomes lignosus* [*R.A.M.*, xi, p. 400] have clearly shown the necessity for further experiments on this problem covering a wider field. Up to the age of three years, trees are exposed to a greater risk of infection by this fungus in an area cleared of surface timber and jungle stumps than in an uncleared one. Up to the same age the incidence of infection is probably lowest where secondary jungle has been allowed to grow up as a natural cover. The growth of *F. lignosus* is promoted by applications of lime.

Sphaerostilbe repens and *Ustulina zonata* were common on rubber roots [ibid., x, p. 160], mixed attacks by the two fungi being also observed on several occasions.

DOPHEIDE (A. B. A.). **Drie meeldauw-campagnes.** [Three mildew campaigns.]—*De Bergcultures*, vi, 26, pp. 653–655, 1932.

Details are given of three campaigns against *Hevea* rubber mildew [*Oidium heveae*] conducted on the Proempang estate, Java, during the seasons of 1929, 1930, and 1931 [*R.A.M.*, x, pp. 56, 205; xi, p. 470]. In the first year five dustings with sulphur with the Björklund apparatus reduced the number of trees suffering total defoliation from 15 to 1 per cent., while the number of those with entirely healthy leaves was increased from 3 to 44 per cent. The total cost of the treatment (excluding cost of the machine) worked out at Fl. 5·48 per bouw [= 0·71 hect.]. In 1930 80 per cent. of the dusted trees remained free from infection, 19 per cent. were very mildly attacked, and only 1 per cent. showed slight defoliation. The costs were considerably lower than in 1929 (Fl. 3·90 per bouw). The results of the third campaign in 1931 were

even more satisfactory, 90 per cent. of the treated trees being entirely free from mildew, while the remainder showed slight spotting with a negligible amount of defoliation. The costs were still further reduced, amounting only to Fl. 2·28 per bouw, divided as follows: 15·14 kg. of sulphur Fl. 1·89, wages 0·20, benzine and oil 0·18, and miscellaneous 0·01. The number of treatments and the quantity of sulphur required for the treatment of a given area was found to vary considerably in different parts of the same plantation, the minimum quantity of sulphur used per round being 3 kg. per bouw and the maximum 8 kg., while the total ranged from 8·99 to 20·96 kg. per bouw, in the 1931 campaign.

Passalacqua (T.). **Marciume apicale secco del 'Capsicum annuum' L. prodotto dal Bacillus coli-capsici n. var.** [Apical dry rot of *Capsicum annuum* L. caused by *Bacillus coli-capsici* n. var.] —*Riv. Pat. Veg.*, xxii, 3–4, pp. 59–62, 1932.

In the summer of 1931, chilli pepper (*Capsicum annuum*) growing in the vicinity of Palermo developed a dry rot of the apical part of the fruits, characterized by a somewhat extensive darkening and thinning of the tissues, which were invaded by common saprophytes. The affected fruits were rather deformed, as a result of their irregular growth. The attack began on ripening fruits as a small yellow spot at the upper extremity, where the tissues were softened and contained bacteria. The disease was present in all the gardens visited, being most severe on the so-called Naples variety, recently introduced. Apparently it had been present for some years, but had not been serious enough to attract attention.

From recently affected fruits, the author isolated a motile, monotrichous, asporogenous, Gram-negative bacillus measuring 0·75 to 1 by 0·25 μ, the physiological and morphological characters of which lead him to refer it to the *coli-simili* group; he names the organism *Bacillus coli-capsici* n. var. Inoculations of healthy pepper and tomato plants gave positive results.

De Haan (J. T.) & Peelen (J. R. C.). **Palavruchtschimmel.** [The Nutmeg fungus.]—*De Bergcultures*, vi, 23, pp. 584–594, 3 graphs, 1932.

After briefly summarizing Steinmann's investigations in Java on the nutmeg fungus (*Coryneum*) [*myristicae*: *R.A.M.*, x, p. 209], the first-named writer discusses the replies to a *questionnaire* circulated to seven planters.

Five out of the seven stated that the disease had been serious of recent years. The two plantations on which little damage occurred are situated at a distance from any others, and in one of these cases freedom from infection was also attributed to the regular practice of collecting and burying the shells. The high relative humidity of the air, especially in the early months of the year, was considered by one planter to be a factor in the causation of the disease. The losses on the plantations in question were very variable, ranging from 2 to 75 per cent. of the crop, or 94 per cent. counting the nuts of inferior quality. On one estate where severe losses occurred, it was estimated that only 1·3 per cent. of the nuts

from ten trees gathered during a 14-day period were of prime quality.

It would appear from information elicited by the second-named writer at the Central Java Experiment Station that the age of the trees has no effect on the course of the disease. Infection is heavier and the quality of the nuts inferior when the west monsoon sets in early, with a high monthly mean precipitation during the second part of the year. Beneficial results have consistently followed the collection and burying of the shells.

MARTIN (J. P.). **Pathology.**—*Proc. Hawaiian Sugar Planters' Assoc., Fifty-first Ann. Meeting, 1931*, pp. 605–618, 1 pl., 1 fig., 1 map, 1932.

In addition to the information given in previous notices on chlorotic streak disease of sugar-cane in Hawaii [*R.A.M.*, xi, pp. 4, 540], it is here stated that none of the bacteria isolated from such plants and inoculated into healthy ones gave conclusive results. Control should be based on the selection of healthy material for planting, roguing diseased plants as they are found in the field, and hot water treatment of setts.

Notes are also given on eye spot [*Helminthosporium ocellum*], pokkah-boeng [*Gibberella moniliformis*: ibid., xi, p. 4], red stripe [*Phytomonas rubrilineans*: ibid., xi, p. 542], and other diseases observed during the year. A map shows the distribution of the major sugar-cane diseases in different parts of the world.

MARTIN (J. P.). **Seed borne diseases of Sugar Cane.**—*Proc. Fourth Congr. Internat. Soc. Sugar Cane Technologists*, 1932. [Abs. in *Facts about Sugar*, xxvii, 7, p. 300, 1932.]

In view of the frequent shipment of propagating material in the form of cuttings and 'fuzz' (cane seed) between different cane-growing districts and countries, all information concerning diseases that may be disseminated in this way is considered to be of vital importance. There is as yet no record of the dissemination of infection by means of true cane seed, but a special investigation on the subject is considered desirable.

COOK (M. T.). **Parasitism of Marasmius sacchari Wakker.**—*Proc. Fourth Congr. Internat. Soc. Sugar Cane Technologists*, 1932. [Abs. in *Facts about Sugar*, xxvii, 7, p. 300, 1932.]

The pathogenicity of *Marasmius sacchari* on sugar-cane [*R.A.M.*, iv, pp. 259, 313; vi, pp. 79, 80] having been questioned by some investigators, the writer made a study of this fungus [in Porto Rico], where it was found to attack and often destroy the leaves, stems, and roots of young plants.

TAI (F. L.). **Collections of fungi in China by foreign explorers.**—*Nanking Journ.*, i, pp. 537–548, 1932.

Notes, together with lists of the new species recorded, are given of the fungus collections made in China by Delavay (1881 and 1893), Komarov (1896), Miyake (1908–12), Reinking (1919), Miura (1918–30, 64 species), Hara (1926), and Skvortzow (1925 and 1927). Handel-Mazzetti collected in south-western China from

1914–18, but his list has not yet been published. From 1923–26 R. H. Porter made collections of fungi in various parts of eastern China, a preliminary note on which has appeared [*R.A.M.*, v, p. 656].

URRÍES Y AZARA (M. J. de). **Datos sobre micromicetos de la provincia de Huesca.** [Data on micromycetes of the province of Huesca.]—*Bol. Soc. Española Hist. Nat.*, xxxii, 4, pp. 213–229, 5 figs., 1932.

A list, accompanied by taxonomic annotations and Latin diagnoses of the new species, is given of 67 species of fungi collected by the writer since 1930 in Huesca. Nine species and three forms are described as new, while eleven genera are recorded for the first time in Spain. *Monopus caballeroi* n. sp., found on living leaves of *Salvia officinalis*, is characterized by amphigenous, globose, black perithecia, usually occurring in groups of three, 90 to 100 μ in breadth, furnished with 'feet' or cylindrico-conical stromatic masses 30 μ in length, from which hyphae radiate into the mesophyll of the leaf; and cylindrical to clavate, sessile asci, 40 to 50 by 7·5 to 9 μ, containing eight distichous, ellipsoid, hyaline, uniseptate ascospores. This is believed to be only the second species of *Monopus* hitherto recorded.

Cytosporina manninoi n. sp., occurring on living branches of *Quercus ilex*, forms numerous scattered, verruciform, erumpent, lobulate stromata, containing large divided locules; hyaline, cylindrical, simple basidia, 11 to 17 by 4 μ; and hyaline, allantoid, curved spores with rounded ends, 40 to 50 by 5 to 6 μ.

Hendersonia crastophila was found on leaves of *Sorghum halepense* [*Andropogon halepensis*], and living box (*Buxus sempervirens*) leaves were attacked by *Macrophoma candollei* (Berk. & Br.) f. *ramosa* n. f., which is characterized by cylindrical, hyaline, straight or slightly curved spores, 27 to 35 by 5 to 8 μ, and variable hyaline basidia, either short and simple or more often long and profusely branched, 6 to 35 by 4·2 μ.

JØRSTAD (I.). **Notes on Uredineae.**—*Nyt Magazin for Naturvidenskaberne*, B. lxx, pp. 325–408, 17 figs., 1932.

This is an annotated account of 186 Norwegian rusts, to which a six-page bibliography is appended.

SPARROW (F. K.). **Observations on the aquatic fungi of Cold Spring Harbour.**—*Mycologia*, xxiv, 3, pp. 268–303, 2 pl., 4 figs., 1932.

In this paper the author describes 40 aquatic species of Phycomycetes which were found at Cold Spring Harbour, Long Island, New York; four are believed to be new to science, and fifteen appear to be reported for the first time from the United States. Latin diagnoses of the new species are appended.

BOSBERGER (J. C. A.). **De 'Thee-schimmel' (djamoe dipa) een gevaar voor onzen Thee-aanplant?** [Is the 'tea fungus' (djamoe dipa) a danger for our Tea cultivation?]—*De Bergcultures*, vi, 23, p. 577, 1932.

In connexion with a recent article describing the cultivation of

the 'tea fungus' [*Bacterium xylinum* and *Saccharomycodes ludwigii*] in Java [*R.A.M.*, xi, p. 548], the writer states that a number of planters deprecate the extension of these organisms on account of the supposed risk to the tea plantations and the fermenting processes in the factories. They will not, therefore, associate themselves with the propaganda for the cultivation of the 'fungus' among the native population unless they are officially notified by the phytopathological authorities that such fears are groundless.

STOREY (H. H.). **Leaf curl of Tobacco in Southern Rhodesia.**—*Rhodesia Agric. Journ.*, xxix, 3, pp. 186–192, 1932.

The writer's comparative observations in East Africa and Southern Rhodesia clearly indicate that the tobacco disease known in the latter province as 'leaf curl', 'crinkling', or 'frenching', is identical with that designated as 'crinkly dwarf' in South Africa, 'cabbaging' in Nyasaland, and 'kroepoek' in Java [*R.A.M.*, xi, p. 478]. 'Leaf curl' being the accepted name for the analogous disease in cotton, this term will in future be employed for the disorder of tobacco in Amani and Rhodesia. The whitefly (Aleyrodidae), *Bemisia* (?) *gossypiperda* [cf. ibid., xi, p. 76], responsible for the transmission of the disease at Amani, is probably also the agent of dissemination in Rhodesia, but investigations in collaboration with J. C. F. Hopkins are in progress to prove this point. Entomologists are apparently agreed as to the impracticability of controlling the insect in the field, and it is therefore most important to remove the source of the virus. In Amani this is a weed, *Vernonia* sp. (Compositae), from which leaf curl has been experimentally transferred to tobacco by whiteflies bred on healthy bean plants. No alternate host of the virus has yet been found in Southern Rhodesia, but it is certain that the infective principle is carried over the winter in surviving tobacco plants in the previous season's fields. The destruction of all such material is, therefore, essential to the control of leaf curl, while the breeding of resistant varieties should also be considered as a safeguard against future serious outbreaks.

In the writer's opinion the enations (including the simple greening of the veins) are the primary diagnostic feature of the disease under discussion, inasmuch as they constitute an unusual type of abnormality, while leaf curl may arise from a number of causes. It is mainly on this basis that the disturbance observed on the Orinoco White Stem variety in Rhodesia is identified with the Amani disease. The leaf curl symptoms, moreover, are extremely variable, sometimes consisting merely in a mild curling; greening of the veins is also sometimes absent.

Leaf curl has been produced by feeding the whitefly, collected on diseased tobacco plants, on healthy seedlings, but not by means of insects bred on healthy bean plants. It is necessary to cage considerable numbers of the whitefly in lamp glasses covering the entire plants. The symptoms experimentally induced include a transitory clearing of the veins of young leaves, a mild curling typical of the variety at Amani, the greening of some of the veins, and a stunting of the plants.

BENINCASA (M.). **Una malattia dei semenzi di Tabacco.** [A seedling Tobacco disease.]—*Ist. Sper. per la Tabacchicoltura Salentina*, Lecce, 1931. [Abs. in *Riv. Pat. Veg.*, xxii, 1–2, p. 41, 1932.]

In 1931 considerable damage was caused to Levantine tobacco seedlings growing in south-eastern Italy by an attack attributed to *Bacterium pseudozoogloeae* [*R.A.M.*, vi, p. 444; x, p. 62]. The disease [the symptoms of which are indicated] makes its appearance during cold, damp weather in March and April; the local growers resort to Bordeaux mixture for control purposes.

NOLLA (J. A. B.). **Las enfermedades del Tabaco en Puerto Rico.** [Tobacco diseases in Porto Rico.]—*Puerto Rico Dept. Agric. y Com., Estac. Insul. Bol.* 39, 29 pp., 6 figs., 1 diag., 1932.

Notes are given on the symptoms, causes, and control of a number of diseases affecting the Porto Rican tobacco crop, of which the most important are damping-off of seedlings (*Pythium de Baryanum* and *Phytophthora nicotianae*) [*R.A.M.*, x, p. 777], the latter being responsible also for black shank; root rot (*Thielaviopsis basicola*) [ibid., x, p. 346] on the yellow Consolación variety in the Río Plata Valley; mosaic [ibid., x, p. 412]; and leaf spot (*Cercospora nicotianae*) [ibid., vi, p. 602 and next abstract]. Instructions are given for the preparation of Bordeaux mixture (4–4–50), the application of which is generally effective against the fungous diseases enumerated above.

HOPKINS (J. C. F.). **Mycological notes. Seasonal notes on Tobacco diseases. 3. Frog eye. 4. White mould.**—*Rhodesia Agric. Journ.*, xxix, 3 pp. 202–204, 1932.

Popular notes are given on the occurrence and control in Southern Rhodesia of the tobacco diseases known as frog eye [*Cercospora nicotianae*: *R.A.M.*, ix, p. 140] and white mould [*Erysiphe cichoracearum*: ibid., x, p. 585]. The former appears to be increasing in prevalence and is liable to cause heavy losses especially in the form which becomes manifest in the curing barns; two years ago it was held responsible by a big buyer for putting a large proportion of the season's crop in the 'perished' grades. A determined effort to eradicate this disease is necessary to avoid serious damage.

OLITSKY (P. K.) & FORSBECK (F. C.). **The inactivation of mosaic disease virus by pulverizing infected tissue.**—*Science*, N.S., lxxv, 1950, pp. 518–519, 1932.

Details are given of the writers' experiments on the inactivation of the tomato mosaic virus [*R.A.M.*, xi, p. 257].

No appreciable loss of virus potency was caused in the top leaves of several hundred diseased plants by drying and grinding for five minutes with pestle and mortar. Partial or complete inactivation was effected, however, by placing measured amounts of the pulverized tissue with four polished steel balls, 1·1 cm. in diameter, in Pyrex bottles which were subjected to active agitation in a shaking machine.

In one of two typical experiments it was found that complete

inactivation was produced by 4, 6, or 12 hours' pulverization, while in the other, 8 and 2 out of 18 tomato plants became infected on inoculation with material pulverized for 6 and 12 hours, respectively. Inactivation of the virus took place more rapidly under anaerobic than under aerobic conditions. For instance, in two typical tests, 30 out of 32 plants inoculated with material before comminution were positive and 20 out of 32 injected with virus pulverized for 12 hours showed mosaic, whereas none of the 29 plants developed infection after inoculation with material subjected to anaerobic pulverization for 12 hours.

In three adsorption tests virus powder was mixed with normal plant powder pulverized for 4 and 10½ hours, respectively. This mixture was either shaken for three hours and its aqueous suspension immediately filtered, or it was allowed to stand as a suspension for two hours before filtration. Furthermore, the relative amount of virus filterable from suspensions of large and small particles (obtained by winnowing through a glass tube) was determined. In these tests 190 plants were inoculated by McKinney's method [ibid., vii, p. 45], usually with a series of tenfold dilutions beginning at 1 per cent. All filtrations were made through Berkefeld 'N' candles.

In the three adsorption tests, 75 per cent. of 104 plants were positive after inoculation with comminuted virus mixed with finely pulverized normal plant tissue, as compared with 77 per cent. of 86 control plants inoculated with virus powder alone. In the winnowing experiment with particles of three degrees of magnitude, no differences in virus potency were detected, so that there is evidently no special tendency of the smaller particles to adsorb virus. Adsorption, if it occurs, is therefore probably not the main cause of the inactivation.

BEWLEY (W. F.). **The nature of the virus principle in mosaic disease.**—*Seventeenth Ann. Rept. Cheshunt Exper. & Res. Stat., Hertfordshire, 1931*, pp. 45–46, 1932.

Evidence previously obtained in connexion with a study of tomato mosaic suggested that the virus might be of the bacteriophage type [*R.A.M.*, x, p. 536]. During the latter part of March and early April, 1931, fresh samples of juice were prepared from plants infected with aucuba mosaic and also from healthy plants, filtered through L 3 filters, and added to five-day potato-broth cultures of the bacterial organism originally isolated from a diseased stem [loc. cit.]. In the case of the infected juice there was distinct clearing of the cultures in 18 hours, which became more marked in 24, while after 72 hours turbidity began to redevelop. No clearing action could be obtained with samples of aucuba, mild mosaic, and stripe disease juice prepared in late April and May.

READ (W. H.). **Physiological investigations of mosaic disease of the Tomato.**—*Seventeenth Ann. Rept. Cheshunt Exper. & Res. Stat., Hertfordshire, 1931*, p. 44, 1932.

Preliminary investigations on the effect of aucuba mosaic on the composition of the tomato plant [*R.A.M.*, x, p. 135] indicated

that inoculation with this virus first results in an increase of both total and reducing sugars as compared with the controls. The increase began about eight days after inoculation and reached a maximum about the twelfth day, when it amounted to approximately 100 per cent. over the controls. Some twenty days after inoculation the sugar content of the plants began to fall slightly.

BOLAS (B. D.). **Physiological investigations of mosaic disease.** —*Seventeenth Ann. Rept. Cheshunt Exper. & Res. Stat., Hertfordshire, 1931*, p. 47, 1932.

Previous studies indicated that the progress and severity of both ordinary and aucuba mosaic in the tomato plant [see preceding abstracts] is frequently connected with carbohydrate metabolism. Evidence has now been obtained that the virus in the living tissues of the plant may be inactivated and destroyed by the passage of a direct electric current of suitable intensity (of the order of 5·0 micro amps. per sq. cm. of tissue). By distillation of infected sap in vacuo it was shown that the virus is not volatile, and so far it has proved incapable of passing through a parchment paper dialyser.

AINSWORTH (G. C.). **Mosaic disease of the Tomato.**—*Seventeenth Ann. Rept. Cheshunt Exper. & Res. Stat., Hertfordshire, 1931*, pp. 42–43, 1932.

Inoculations from striped tomato plants [*R.A.M.*, x, p. 536] into young healthy ones, by pricking in the juice, friction, or incision of the stem and insertion of portions of necrotic tissue, almost invariably resulted in the development of mild mosaic. The number of plants contracting stripe never amounted to more than 40 per cent. of those inoculated. On the other hand, 'streak', produced by a mixture of potato mosaic virus and mild mosaic of tomato [ibid., x, p. 537], showed certain marked differences from stripe. The resultant symptoms resemble those of stripe but are more severe, the plants showing acute leaf necrosis and stem lesions accompanied by marked stunting. Artificial inoculation by friction with cheese-cloth moistened with infected juice consistently gave 100 per cent. successful infections after five to seven days. Furthermore, it was found that a potash dressing enables striped plants to outgrow the symptoms, whereas it proved useless against 'streak'. The cause of stripe is, therefore, regarded as still obscure. Paine and Bewley showed [in 1919] that *Bacillus lathyri* is capable of inducing the typical symptoms [ibid., i, p. 156], but this organism has since been lost. Other investigators believe that the disease is due to a single or mixed virus.

BEWLEY (W. F.) & ORCHARD (O. B.). **The control of Tomato leaf mould.**—*Ann. of Appl. Biol.*, xix, 2, pp. 185–189, 1932.

Very good control of tomato leaf mould (*Cladosporium fulvum*) has been obtained by two or more applications at weekly intervals (from 19th August onwards) of ⅛ oz. shirlan paste (salicylanilide, supplied by Imperial Chemical Industries, Ltd., London) [*R.A.M.*, x, p. 598], ¼ oz. agral I [ibid., xi, p. 211], and 1 gall. water. In

preliminary tests this mixture also proved satisfactory against cucumber mildew (*Erysiphe cichoracearum*) and the powdery mildews of chrysanthemum and rose (*Oidium chrysanthemi* and *Sphaerotheca pannosa*, respectively). [An abbreviated account of this work is given in the *Seventeenth Ann. Rept. Cheshunt Exper. & Res. Stat., Hertfordshire, 1931*, pp. 39–41, 1932.]

Bekämpfung der Braunfleckenkrankheit der Tomaten durch Verstäuben von Kupferkalkpulver? Meinungsäusserungen aus Wissenschaft und Praxis. [Control of Tomato leaf mould by dusting with copper-lime dust? Expressions of opinion based on science and practice.]—*Obst- und Gemüsebau*, lxxviii, 5, pp. 75–76, 1932.

Only one of the six German scientific and horticultural experts consulted regarding the use of copper-lime dusts against tomato leaf mould (*Cladosporium fulvum*) [*R.A.M.*, x, p. 764] had actually used one of these preparations (M. Tillack, Breslau), and he was unable to obtain complete control by this or any other means, including spraying with solbar and sulphur fumigation. In the Winsen [near Hamburg] district, Bordeaux mixture, thisol, solbar, and nosprasit have all been used against *C. fulvum*; of these the last-named is the most effective but has the disadvantage of causing unsightly spotting of the fruits.

Samuel (G.). **Macrosporium solani on Tomato fruit.**—*Phytopath.*, xxii, 6, pp. 613–614, 1 fig., 1932.

Macrosporium [*Alternaria*] *solani* is stated to be increasing in prevalence in tomato greenhouses in South Australia, but has never been observed to cause 'nailhead spot' (also attributed to *M.* [*A.*] *tomato*) [*R.A.M.*, x, p. 767]. The fungus may be very severe on the leaves without affecting the fruit, but in a case examined by the writer green fruits of the Early Red Dwarf variety showed hard, sunken lesions mostly starting either at the stem or calyx end but occasionally lateral. On specimens kept in a moist dish for about a fortnight the mycelium spread slowly through the ripening fruit, causing a soft rot with a dark brown discoloration. *A. solani*, therefore, though capable of attacking the fruit, does not appear to be involved in the development of nailhead lesions.

Solovieff (F. A.). Некоторые редкие и малоизвестные виды грибов Северо- Кавказского края. [Some rare and little known fungi from North Caucasus.]—*Bull. Plant Protection*, Leningrad, v, 1, pp. 119–123, 1 pl., 1 fig., 1932.

In this paper notes of taxonomic and local interest are given on the following less common lignicolous fungi in North Caucasus. *Polyporus croceus* (syn. *P. pilotae*) [*R.A.M.*, ix, p. 216] was found on living chestnuts [*Castanea* sp.], causing a mottled heart rot; the writer states that although Jaczewski considered *P. croceus* to be synonymous with *P. rutilans*, these two species are definitely distinct. *P. dryadeus* [ibid., x, p. 141] was found growing at the base of chestnut and oak trees, *P. berkeleyi* on the roots and stumps of the Caucasian fir (*Abies nordmanniana*), *P. giganteus* at the base of beech trees, *Fomes nigro-laccatus* at the base of

living oak trees, and *Poria* sp. on injured and dead stems of *Buxus sempervirens*. A Latin diagnosis is given of *Ceratostomella castaneae* Vanine & Solovieff, n. sp. [see above, p. 616] which causes a superficial greyish-black discoloration of chestnut timber. The oval superficial perithecia measure 68 to 85 by 34 to 43 μ; the base is covered with hairs, 200 to 357 μ long, and the beak, 1100 to 1800 μ in length, is provided with about 10 apical setae, 14·7 to 20 μ long. The bacillary, hyaline ascospores measure 4·4 to 7·4 μ in length.

Reitsma (J.). **Studien über Armillaria mellea (Vahl.) Quél.** [Studies on *Armillaria mellea* (Vahl.) Quél.]—*Phytopath. Zeitschr.*, iv, 5, pp. 461–522, 8 figs., 3 diags., 1932.

A comprehensive and fully tabulated account is given of the writer's studies on *Armillaria mellea*, conducted at the 'Willie Commelin Scholten' Phytopathological Laboratory, Baarn, Holland.

The development of fructifications was found to depend largely on environmental factors. Sporophores developed on a number of solid and liquid media favourable to mycelial and rhizomorph production, e.g., peptone-glucose-saccharose agar, beerwort-salep-agar, X agar (consisting of one part each of cherry agar, peptone-glucose-saccharose agar, and oat malt agar), blotting paper soaked in a peptone-containing nutrient solution, and on fragments of elm branches, the last-named being the most satisfactory. The fruit bodies formed in three to four months at 18° to 22° C. in diffused daylight. On elm twigs they were normal in appearance, whereas those produced on the other media were mostly abnormal though frequently giving rise to viable spores which germinated and produced mycelium and rhizomorphs. The optimum temperature for growth was 25° and the optimum P_H value 5. The formation of rhizomorphs was completely suppressed by constant subculturing of the mycelium in liquid media, but on transference to a solid substratum these bodies reappeared.

Corrosive sublimate, uspulun, germisan, copper sulphate, and copper chloride exercised an inhibitory effect on the growth of the *Armillaria* strains, especially in alkaline media. The phenol derivatives, metadioxybenzol and hydroquinone, suppressed the growth of rhizomorphs in concentrations down to 0·1 per cent., while tannin exerted a stimulatory action on the development of the fungus [*R.A.M.*, ix, p. 278].

Inoculation experiments with *A. mellea* on a number of young trees and plants, either through the soil or through wounds, gave negative results, except for slight mycelial production on the roots of a few *Picea excelsa* seedlings in pots [cf. ibid., x, p. 496]. Soil disinfection tests [full details of which are given] indicated that the best control of *A. mellea* is effected by 0·6 per cent. uspulun or corrosive sublimate (20 l. per sq. m.), carbon disulphide (100 gm. per sq. m.), or 10 per cent. copper sulphate with an admixture of calcium oxide. It was shown by investigations on the behaviour of *A. mellea* in various types of soil that the best growth occurs in light, acid soils, little or no development being made in heavy, alkaline, saline (sodium chloride) soil.

There has been much discussion on the position of *A. mellea*

as an injurious fungus owing to the present imperfect knowledge of its pathogenicity under varying environmental conditions. In the author's opinion, it is best regarded as a facultative parasite with the properties of a perthophyte [ibid., ix, p. 47].

Investigations on the phenomenon of luminescence [ibid., ix, p. 278] and on various other aspects of the physiology and biology of *A. mellea* are described, and a bibliography of 156 titles is appended.

KRAHL-URBAN (J.). **Bekämpfung des Eichenmehltaus.** [Control of the Oak mildew.]—*Forstarch.*, *1932*, 10, pp. 174–177, 1932.

From 1928 to 1931, inclusive, experiments in the control of oak mildew [*Microsphaera quercina*: *R.A.M.*, ix, p. 548; x, p. 775] were carried out in the nurseries of the forest of Freienwalde (Oder) on one-, two-, and three-year-old seedlings of the common oak [*Quercus robur*]. During the first two years of the tests the incidence of infection was slight, in the later ones somewhat heavier. The treatments were applied in the early morning when the sky was overcast, the preparations used being (1) ordinary ventilated (powdered) sulphur [cf. ibid., ix, p. 16], (2) cosan [ibid., viii, p. 687], both supplied by J. D. Riedel & E. de Haën A.-G., Seelze, near Hanover, and (3) a sulphur dust known as erysimors (E. Merck, Darmstadt), which is not yet on the market. Some of the trees were treated shortly before coming into leaf, others after, while in certain lots the applications were postponed until the first signs of mildew appeared. Intervals of four weeks elapsed between each treatment, the last of which was given at the end of August or beginning of September.

Both the ventilated sulphur and erysimors dusts proved equally efficacious in the control of mildew, while spraying with cosan was less reliable, though not without value. The date of the first application was apparently immaterial provided it was made at or before the first sign of infection. In future one treatment will be given after the trees come into leaf and another on the appearance of the fungus. The manufacturers being unable to supply erysimors at a lower rate than ordinary sulphur dust, the latter will be used. The estimated cost of two applications (including wages) is M. 1·06 per acre. For larger plantations in the open spraying is more likely to be effective than dusting and to cost considerably less.

BROWN (NELLIE A.). **Canker of Ash trees produced by a variety of the Olive-tubercle organism, Bacterium savastanoi.**—*Journ. Agric. Res.*, xliv, 9, pp. 701–722, 7 figs., 1932.

A summarized account is given of the biological and cultural investigation, started in 1913, of a bacterium which was isolated from cankers on branches and twigs of European ash (*Fraxinus excelsior*) received by the author from Vienna. Inoculations with pure cultures reproduced the disease on young American ash trees (*F. americana*), the lesions varying in size from small cracks in the bark with thickened margins to irregular, fluted outgrowths several inches in length and width, with cavities extending into

the wood, and increasing in size and number from year to year on the trunk and the branches. The disease has not been reported in the United States.

As shown in comparative tables, the morphological and cultural characters of the bacterium are very similar to those of *Bacterium* [*Pseudomonas*] *savastanoi* [*R.A.M.*, vii, p. 724, *et passim*] to which the disease was attributed by Vuillemin in 1900. In view, however, of the minor differences [presented in tabular form] and of the fact that the ash organism was shown to be non-pathogenic on the olive and the two strains of *P. savastanoi* from olive which were tested failed to infect the ash [cf. ibid., vii, p. 725], the former is considered to be a variety of the latter, and the name *P. savastanoi fraxini* n. var. is suggested for it.

MILLER (P. W.). **The brown-stain disorder of Filberts.**—*Better Fruit*, xxvi, 9, pp. 7–8, 12, 2 figs., 1932.

Filberts [*Corylus avellana*] in the Pacific Northwest were extensively affected in 1931 by a disorder known as 'brown stain', the first symptom of which is the appearance of a brownish liquid in localized areas on the sides or ends of the nuts; later the internal tissues also become involved, turning watery brown or chocolate-coloured, and the kernel development is arrested. The disturbance seems to reach a climax during the period from 4th to 24th July and to be almost exclusively confined to the Barcelona variety. Different theories have been suggested in explanation of brown stain, but so far the cause has not been definitely ascertained. No infectious micro-organism seems to be involved.

ALBEN (A. O.), COLE (J. R.), & LEWIS (R. O.). **Chemical treatment of Pecan rosette.**—*Phytopath.*, xxii, 6, pp. 595–601, 1932.

Pecan [*Carya pecan*] rosette [*R.A.M.*, ix, p. 208] is stated to be responsible for heavy losses (up to 95 per cent.) in the southern United States. The disease progresses from a mild chlorosis of the upper leaves to dwarfing and crinkling of the foliage, shortening of the internodes, and the ultimate death of the twigs and branches. Rosette seldom or never kills an entire tree, but severe cases may be accompanied by sterility and such great weakness that the affected individuals die from the attacks of borers or other causes. The disease occurs both on residual and alluvial soils, being generally favoured under the former conditions by eroded areas, a light subsoil, light soil texture, and deficiency of organic matter, and under the latter by a high water table and light soil texture. On the alluvial soils of Louisiana, however, rosette is found irrespective of soil type on trees growing near old building sites and the like as well as in very fertile garden soils. Stuart is the most susceptible variety, followed by Frotscher and Van Deman, while Moneymaker is highly resistant.

Previous investigations on the disease [which are summarized] and the writers' observations strongly favour a non-parasitic origin, the development apparently depending on the presence of some unknown soil factor or factors. Rosette does not appear to

spread from diseased to healthy trees but to occur simultaneously on all those in a given locality.

In April, 1930 and 1931, calcium sulphate, manganese sulphate, magnesium sulphate, and potassium chloride were applied to both hill and bottom-land soils and ploughed under, while in August, 1931, ferrous and ferric sulphate were placed in trenches on bottom-land soils. So far none of these treatments has given beneficial results, while the application to the trees, in May, 1931, of these and other compounds was also ineffective. Ferric sulphate and ferric chloride (0·1 to 1 per cent.), however, improved or cured the condition of Schley and Stuart trees sprayed with them in August, 1931; slight burning of the foliage occurred but soon disappeared. Pecan rosette would appear, therefore, to be a form of iron chlorosis [cf. ibid., x, p. 676].

CARTWRIGHT (K. St. G.). **Further notes on Basidiomycetes in culture.**—*Trans. Brit. Mycol. Soc.*, xvi, 4, pp. 304–307, 2 pl., 1932.

This is a brief discussion of the macro- and microscopical characters exhibited by *Polyporus fumosus*, *P. adustus*, and *Lenzites trabea* in pure culture on 2 per cent. Kepler's malt extract agar. It is pointed out that the culture of *L. trabea* was identical in every respect with a culture of *L. thermophila* received from the Centraal Bureau voor Schimmelcultures, Baarn, and also with a culture of *Trametes protracta* sent by Dr. Liese.

LURIE (REBECCA). **Some organisms concerned in mine-timber decay.**—*Trans. Brit. Mycol. Soc.*, xvi, 4, pp. 270–288, 3 pl., 4 figs., 1932.

Isolations from rotted mine timber from a stope in the Rand Gold Mines, Transvaal, yielded six species of imperfect fungi, three of which have not yet been identified, the remaining three being a species of *Fusarium*, one of *Aspergillus*, and the third (identified by Miss Westerdijk) *Bispora effusa* Peck. Tests of the rotting capacities of the six organisms on wattle (*Acacia decurrens*), blue gum (*Eucalyptus globulus*), and pitch pine (*Pinus palustris*) wood, showed that, of the six, *B. effusa* alone was able to destroy the wood in a comparatively short time, reducing the sap-wood of seasoned and unseasoned wattle to a pulpy consistency in six weeks. All the evidence supplied by the investigation indicated that *B. effusa* was the causal organism of the mine timber decay.

The spores of *B. effusa* vary greatly in shape and size, from almost spherical and about 6 to 7 by 4 to 5 μ, to large cylindrical and 18 by 4 to 5 μ. The spores most usually found in cultures were brownish-black, two-celled, and measured 12 to 14 by 4 to 5 μ; they were produced in chains of varying length, no distinct conidiophores being formed. The septate hyphae averaged 4 μ in diameter, their colour ranging from hyaline to almost black.

MANN (R. H.). **Wood preservation—economic and engineering aspects.**—*Civil Engin.*, ii, 4, pp. 223–228, 8 figs., 1 graph, 1932.

A brief historical survey of the development of wood preser-

vation in the United States is followed by observations on the nature of decay and a study of the methods of combating it. The discussion is limited to two preservatives, coal-tar creosote and zinc chloride, which were used for about 98 per cent. of the timber treated in 1930 [cf. *R.A.M.*, viii, p. 619].

The amount of preservative specified per cu. ft. of timber depends largely on the severity of the conditions to be withstood. For highway bridges a 12 lb. retention of creosote is usually specified, while an 8, 10, or 12 lb. treatment by an empty cell process is ordinarily required by power and telephone companies. Formerly railway sleepers were treated with 6 lb. creosote per cu. ft., but larger quantities are now generally specified (8 lb. creosote or ½ to 1 lb. zinc chloride). Reports just submitted by the Chicago, Burlington, and Quincy Railroad, including 1931, show an estimated service life of sleepers treated with these two preservatives varying from 14·33 to 24·8 years, compared with 5·8 for untreated. In 1930 C. C. Cook, Maintenance Engineer of the Baltimore and Ohio Railroad, calculated that American railways were saving $145,000 per day through the impregnation of sleepers, and that when an average life of 20 years or more is realized a daily saving of $387,000 will be effected. A number of creosoted timber bridges that have been in constant use for over 30 (up to 48) years are stated to be still perfectly sound, as shown by the results of an inspection by a committee of the American Railway Engineering Association in California in 1928. The life of full-length pressure-creosoted southern pine [*Pinus ponderosa*] poles has been estimated at 25 to 40 years, and the number treated has increased from 67,541 in 1918 to 2,428,000 in 1930.

The relative costs of treated and untreated timber may best be compared on the basis of annual charges for the material in place. The usual equation for computing the annual charge is: $A = Pr\left(\frac{(1+r)^n}{(1+r)^n-1}\right)$ in which A = the annual charge, P = first cost, n = number of years of service life, and r = rate of interest expressed decimally. Assuming the rate of interest to be 6 per cent., the cost of installing an untreated sleeper $1.40, and its estimated life six years, the corresponding figures for a treated sleeper being $1.80 and 23 years, respectively, the annual charges, using the above equation, will be as follows: for the untreated tie costing $1.40 (6-year period), $0.284, and for the treated, costing $1.80 (23 years), $0.146, giving an annual saving of $0.138 in favour of the latter.

POPHAM (F. T.) & KAMESAM (S.). **A new wood preservative—the 'Falkamesam' process.**—*Indian Forester*, lviii, 4, pp. 191–195, 1932.

The second author, working in Germany under the supervision of Prof. R. Falck on the fixation of arsenic in timber for preservative purposes [*R.A.M.*, xi, p. 216], evolved the 'Falkamesam' process, and tests have recently been conducted to verify the claims of this process at the Dehra Dun Forest Research Institute, India. This method of timber impregnation costs about one-sixth as much

as the creosote treatment and one-quarter as much as that with creosote and fuel oil [ibid., xi, p. 414].

Sapwood blocks, 2 by 1 by $\frac{3}{4}$ in., of *Shorea robusta*, *Albizzia procera*, *Pinus longifolia*, *Abies pindrowi*, and *Terminalia tomentosa* were treated under pressure in a 2 per cent. concentration of the preservative and the amount of arsenic absorbed noted. The blocks were then dried in an oven, leached for about two hours by shaking with 100 c.c. of distilled water in an oscillating machine and soaked in the same water for twelve hours, after which they were analysed for the arsenic washed out. The blocks were then dried in the air for two to three days and the above process repeated twice (except for the soaking), the arsenic washed out after 20,000 oscillations being determined in each case.

The following comparative percentages of washed out arsenic were obtained for 'Falkamesam', Powellizing [ibid., xi, p. 146], zinc-meta-arsenite [ibid., ix, p. 80], and As_2O_5, respectively: *S. robusta*, 3, 33, 23, 43; *Albizzia procera*, 2, 37, 30, and 33; *P. longifolia*, 2, 61, 61, and 36; *Abies pindrowi*, 1, 27, 40, and 47; and *T. tomentosa*, 3, 33, 32, and 23, giving averages for the four treatments of 2, 38, 37, and 37, respectively. The superiority of the 'Falkamesam' process is thus apparent, over 95 per cent. of the originally injected arsenic remaining in the wood after 60,000 oscillations with water, and it is anticipated that a protective influence extending over at least some 25 years may result from this treatment.

SHEWELL-COOPER (W. E.). **Club root of Brassicas.**—*Gard. Chron.*, xci, 2369, pp. 387–388, 1 fig. (on p. 379), 1932.

The results of experiments in 1929 and 1932 in Cheshire on the control of finger-and-toe disease [*Plasmodiophora brassicae*] of cabbage and other species of *Brassica* showed that the use of healthy seedlings is of the first importance. Treatment of infected seed-beds, either by dry heat or with mercuric chloride (1 gall. per sq. yd. of a dilute solution), results in the development of a considerable proportion of healthy plants. In some cases the number of healthy plants may also be increased by puddling in with mercuric chloride [*R.A.M.*, xi, p. 146], which has the additional advantage of controlling the root maggot [*Chortophila brassicae*: ibid., xi, p. 17]. Calcium cyanamide, applied to the permanent beds at the rate of 3 cwt. per acre, improves the quality of the plants and may assist them in withstanding infection. At any rate, it produces an increased number of saleable plants, especially in such crops as broccoli and spring cabbage.

[Further experiments on the same lines, with similar conclusions, are reported in *Gard. Chron.*, xcii, 2379, p. 83, 1932.]

GOE. **Beizung von Gemüsesämereien mit 'tillantin R'.** [Disinfection of vegetable seeds with 'tillantin R'.]—*Obst- und Gemüsebau*, lxxviii, 5, p. 76, 1932.

A marked stimulus to germination and a considerable reduction in the incidence of fungous infections were afforded in recent tests in pot cultures under comparable conditions, at Geisenheim-am-Rhein with tillantin R dust, among the diseases controlled being

blackleg of cabbage [*Pseudomonas campestris*] and bean [*Phaseolus vulgaris*] anthracnose [*Colletotrichum lindemuthianum*]. The following germination percentages were obtained in the untreated and treated lots of seed, respectively: tomato 37 and 88, cucumber 64 and 87, melon 6 and 92, spinach 27 and 72, beet 46 and 133, radish 86 and 94, red cabbage 61 and 94, early Savoy cabbage 79 and 96, cauliflower 18 and 47, head lettuce 19 and 79, field lettuce 62 and 87, leek 44 and 65, celery 27 and 63, bush beans 87 and 94, broad beans [*Vicia faba*] 83 and 95, peas 87 and 96. The incidence of disease (per cent.) in the untreated and treated stands was as follows: cucumber 17 and 2, melon 100 and 13, spinach 64 and 0, beet 43 and 6, red cabbage 54 and 8, early Savoy 34 and 3, cauliflower 100 and 24, bush bean 44 and 7, and peas 17 and 0.

BREMER (H.) & HÄHNE (H.). **Heisswasserbeize zur Bekämpfung der Fettfleckenkrankheit der Bohnen.** [Hot water steeping for the control of the grease spot disease of Beans.]—*Nachrichtenbl. Deutsch. Pflanzenschutzdienst*, xii, 5, pp. 34–35 1932.

Promising results were obtained in preliminary tests at Aschersleben, Saxony, in the control of grease spot of beans [*Phaseolus vulgaris*] due to *Phytomonas* (*Pseudomonas*) *medicaginis* var. *phaseolica* [*Bacterium medicaginis* var. *phaseolicola*: *R.A.M.*, x, p. 422] by 15 or 30 minutes' immersion of the seed (Rote Pariser variety) in water heated at 52° or 55° C., preceded by 12 hours' soaking in tap water.

SCHMIDT (E. W.). **Die Cercosporakrankheit der Zuckerrübe in Spanien und die Massnahmen zu ihrer Bekämpfung.** [The *Cercospora* disease of Sugar Beet in Spain and measures for its control.]—*Deutsche Zuckerind.*, lvii, 21, pp. 446–448, 4 figs., 1932.

In the districts of Spain where sugar beets are grown under irrigation, ideal conditions prevail for infection by leaf spot (*Cercospora beticola*) [*R.A.M.*, x, p. 427], i.e., temperatures above 25° C. and relative humidities of 98 per cent. during the few hours required for the germination of the fungus. Consequently the disease has assumed a very severe character, necessitating a campaign organized by several of the larger sugar companies and involving 140 field demonstrations of the use of copper sprays in various districts. In these tests about 2,501 hect. were treated with Bordeaux mixture, for the preparation of which a total of 28,686 kg. of copper sulphate was used. In each demonstration portions of the field were left untreated for comparison. The average yield of the treated areas was 49,460 kg. per hect. as against 43,880 from the untreated, the figures for sugar-content and purity being 16·03 per cent. and 86·26 in the treated and 15·31 per cent. and 85·10 in the untreated. The total cost of the demonstrations was 30,031 pesetas and the financial gain from the increased yield of 3,135,641 kg. of sugar is estimated at 1,328,516 pesetas after deducting all the costs.

The choice of the correct time for the first application of the fungicide is of the utmost importance, and is not an easy matter,

since it depends to some extent on climatic conditions and also on the date of sowing. Generally speaking, however, it has been found that the first application should be given about the middle of July, a second a month later, and a third about the middle of September; in some cases the second may be omitted. The mixture must be applied intensively, using not less than 600 l. per hect. [53 galls. per acre] and preferably 800 l. [71 galls.]. The copper content of the Bordeaux mixture should not be less than 1·5 per cent.

Sugar beets growing in the shade of trees have consistently been found to suffer less from leaf spot than those exposed to the sun, and it is suggested that the efficacy of the copper-lime treatment may be partly due to the protection from the sun afforded by the coating of spray [cf. ibid., ix, p. 258].

LACKEY (C. F.). **Restoration of virulence of attenuated curly-top virus by passage through Stellaria media.**—*Journ. Agric. Res.*, xliv, 10, pp. 755–765, 4 figs., 1932.

This is the full account [an abstract of which has been noticed: *R.A.M.*, x, p. 424] of the experiments in which the author succeeded by passage through *Stellaria media* in restoring to approximately the original virulence the beet curly top virus after it had been attenuated by passage through the very resistant *Chenopodium murale*. The attenuated virus remained stable even though passed through successive generations of very susceptible sugar beets. The average weight of beet plants infected with the attenuated virus was almost three times that of beets infected with the virulent or restored forms of the virus.

WEILER. **Gurkenkrätze.** [Cucumber scab.]—*Möllers Deutsche Gärtnerzeit.*, xlvi, pp. 346–347, 353–354, 1931. [Abs. in *Zentralbl. für Bakt.*, Ab. 2, lxxxvi, 8–15, p. 340, 1932.]

Cucumbers in German greenhouses are stated to be sometimes so severely infected by *Cladosporium cucumerinum* [*R.A.M.*, vii, p. 6; x, pp. 76, 287 and preceding abstract] in consequence of defective methods of cultivation as to be quite unmarketable. During May and June sharp fluctuations of temperature should be avoided, while watering and sprinkling in the late afternoon are also inadvisable. Diseased fruits should be collected and destroyed immediately and preventive applications of Bordeaux mixture or nosperal-lime [ibid., viii, p. 149] should be given repeatedly. The disinfection of the houses by formalin fumes is recommended after an epidemic.

FRICKHINGER (H. W.). **Achtet auf die Meerrettichschädlinge!** [Beware of Horse-radish pests!]—*Obst- und Gemüsebau*, lxxviii, 5, pp. 77–78, 1 fig., 1932.

Attention is drawn to the severe outbreaks of white blister (*Cystopus candidus*) [*R.A.M.*, iii, p. 506; x, p. 556] which have occurred of recent years on horse-radish in some parts of Germany. In addition to the destruction of old leaves and other plant débris after harvesting the crop, the timely application of a copper-containing fungicide is recommended.